

HABITS AND CHARACTERS
OF
BRITISH WILD ANIMALS
By H. MORTIMER BATTEN





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BY
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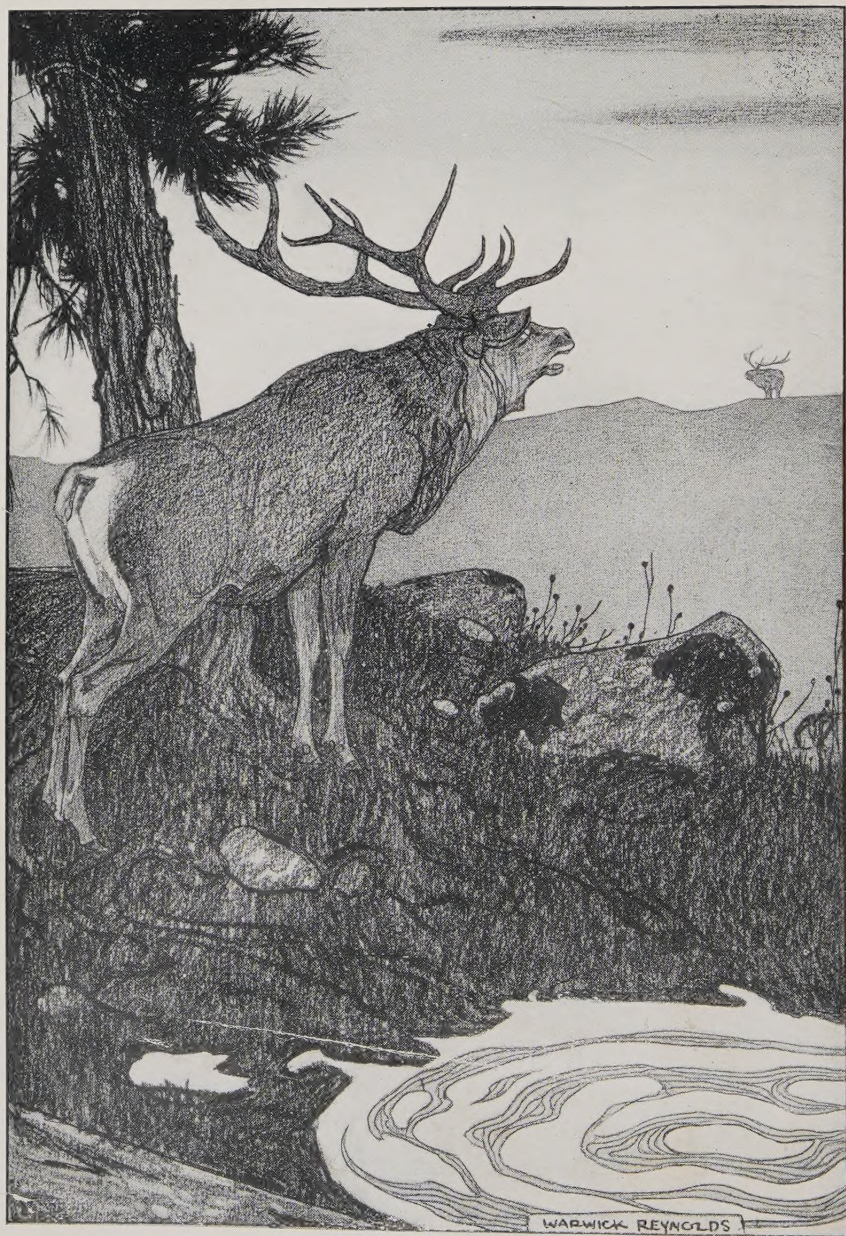
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THE RED DEER.

W. A. — Front.

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INTRODUCTION.

IN the hope of achieving to some degree the virtue of originality—if originality can truly be termed a virtue—this book has been written from practical observations, and, so far as possible, without the aid of references. It is understood that originality strikes the keynote of interest, and while I have perhaps been guilty of shirking the more burdensome and technical details concerning the animals dealt with, I have endeavoured to include not only necessary facts, but also to infuse into each record something of the character of the beast itself. I have considered it essential not only to describe an animal as a creature of certain habits, but also to treat it as a thing of temperament and character, for it is only by the power of insight into this side of nature that one can hope to arrive at a thorough understanding of the denizens of the wild. An American Indian, when trying to impart his knowledge concerning some wild beast, tells you not of its habits, but of its character; and it is because he himself knows so well the temperaments of the creatures he hunts that he is so much a master of woodcraft, for with this knowledge he is at once on the highroad to penetrating the innermost secrets of their lives. In the same way the man who is dependent upon his traps for a living profits at every turn by his intimate knowledge of the creatures he is out to trap. Some he knows to be inquisitive, so he appeals to their curiosity; others he knows to be wary, and he trades on their wariness; all, he knows, have some weakness, some

vulnerable point in their all too inadequate armour of defence, and if he can find it a rich harvest awaits him. We in Britain do not wish to destroy the wild creatures of our woods, but if we are to learn their ways we must first become *au fait* with their characters.

It is, of course, impossible to write from personal observation and study all the data that are necessary for the completion of a book of this kind. One may be tolerably familiar with the life-habits and customs of a certain beast, may indeed regard it as an intimate friend; but life is too short for one to learn from practical observation all the details concerning it that are necessary—its changes of coat, length of life, and so on. If one could devote all one's studies to one particular species, it might be possible; but in dealing with several there comes a point when inaccuracy must be risked or extensive references made. Realising this, my method has been first to write all I know concerning the animal dealt with, and, this done, to apply to outside authority for such supplementary evidence as might prove necessary. If my original notes have appeared sufficient, they have been left untouched; and in every case my own data, when sufficiently wide, have been given, whether or not they happen to coincide with the notes of other, and probably far better qualified, naturalists. On other occasions, personal data on a certain point have either been entirely lacking or insufficiently substantial, in which case the best authorities have been sought and quoted.

A final reading of the finished chapters has brought home very forcibly the realisation that at least half the information contained in this volume is the result of the studies of my boyhood.

It dates back from my ninth year, and a very large number of the incidents quoted occurred during the succeeding seven years. In those days the study of wild birds and animals, particularly animals, combined with an intense love for angling, led me to explore many lonely mountain lochs and forests, and was so absorbing an attraction that it is to be feared it excluded studies of a more important kind. I had no books on British animals; so far as the school library was concerned, no one seemed to have written any, and during holidays a reference library was not within hailing distance. The natural history books annually presented by kindly relatives were given over to such curiosities of the African veldt and the Indian jungle as best lent themselves to illustration, and contained nothing concerning the creatures I knew and loved. Gamekeepers, stone-breakers, and water-bailiffs were the only references available; and I very soon learnt that the sole way to acquire accurate knowledge was to find out for one's self—a state of affairs for which I to-day thank my lucky star!

It was at my special request that the services of my friend and colleague, Mr Warwick Reynolds, were obtained for the illustrations, and the delightful pictures he has produced more than realise my highest expectations. One of the chief reasons for inviting this well-known artist to undertake the task was his reputation for minute accuracy as regards details. The animals he draws are creatures instinct with life and character, set amidst their true environment; Mr Reynolds's striking effects are invariably obtained without sacrifice of that fidelity to truth which is essential in a work of this nature.

There is undoubtedly an astounding dearth of books dealing with the wild life of our woods and hills which strike a happy medium—that is, books which are sufficiently informative without being burdensome to all but the seriously minded naturalist. For every man or woman who wishes to delve deeply into technicalities, there are hundreds who, while not desiring to imbibe solid chunks of knowledge, are sufficiently fascinated by the subject to read with the keenest interest of the life-habits and characters of the wild beasts they see. The tendency is for human life to speed up, and as the tension increases year by year, the need for complete relaxation becomes more and more marked, and tired brains turn more and more to the fresh, calm things of the country. To-day natural history books are more popular than ever before, and it is with the realisation of this growing popularity that I have endeavoured to produce a book which, while being popular, is painstaking and thorough so far as is within the scope of my ability to make it. I hardly hope that it adds very much to the sum of man's knowledge; but if it adds one drop to his cup of contentment, my purpose is achieved.

KILLIN, PERTHSHIRE.

Habits and Characters of British Wild Animals.

THE RED DEER.

Thrice the age of a dog is that of a horse ;
Thrice the age of a horse is that of a man ;
Thrice the age of a man is that of a deer ;
Thrice the age of a deer is that of an eagle ;
Thrice the age of an eagle is that of an oak.

SO says an ancient and interesting adage, which at any rate lacks nothing in extravagance of statement. Throughout Scotland the belief is still firmly rooted among shepherds and foresters of the old school that deer live to an enormous age, often exceeding two hundred years. It is a very curious fact that till quite recently this belief in the longevity of the red deer went practically undisputed, and in glancing through old records of the chase one repeatedly finds reference to famous stags reputed to have evaded many generations of hunters. Indeed, the recognised name of 'Spytard' existed as a designation for harts over a hundred years of age, and I believe that a Spytard was granted certain protections not shared by the younger generations of its race !

Scrope relates one or two incidents which might be taken as conclusive in indicating the abnormal length of life this animal attains, though he himself did not uphold such extravagant views. Concerning a stag which was shot by Glengarry in 1826,

Scrope writes: 'On going up to him [the stag] a mark was discovered on his left ear; the first man who arrived was asked what mark it was? He replied that it was the mark of Ewen-mac-Jan Og. Five others gave the same answer; and after consulting together all agreed that Ewen-mac-Jan Og had been dead 150 years, and for forty years before his death had marked all the calves he could catch with this particular mark; so that this deer (allowing the mark to be authentic) must have been 150 years old, and might have been 180. The horns, which are preserved by the present Glengarry, are not particularly large, but have a very wide spread.'

Later the same writer says: 'I venture to mention that, according to tradition, Captain Macdonald, of Tulloch, in Lochaber, who died in 1775 at the age of eighty-six, knew the white hind of Lochtreig for the last fifty years of his life; his father knew her an equal length of time before him, and his grandfather knew her for sixty years of his own time; and she preceded his days: these three gentlemen were all keen deer-stalkers. Many of the Lochaber and Brae Rannoch men knew her also; she was pure white without spot or blemish.'

A very large stag was known for two hundred years in the Monalia, a range of mountains lying between Badenoch and Inverness. He was always seen alone, keeping the open plains, so that he was unapproachable.

Almost every history of the red deer one picks up furnishes some similar 'proof' of the animal's capability of carrying an unlimited burden of years; but for that matter one can find corroborative proof of almost *any* traditional belief that is sufficiently widely accepted. At the same time, I

am inclined to think that present-day naturalists are insufficiently generous in estimating the length of life of this animal. It is usually held that a stag begins to decline after its fourteenth year, and so far as its antlers are concerned this is undoubtedly so. Deer kept in captivity are seldom known to live so long as thirty years, and as a general rule they become so far advanced in senile decay as to play little or no part in the social intercourse of their kind long before this age is reached. Yet an old stag may live a more or less solitary life for many years ere finally it vanishes.

A great deal, however, must depend upon the conditions under which the animal lives, and taking the normal conditions of the normal hart of the Scottish mountains, there is certainly very little that would seem conducive to great longevity. A seventeen or eighteen stone stag may not turn the scale at eleven stone by the end of the rutting season, and in this weakened and susceptible condition the first savage onslaught of the upland winter finds him. Unable to stand the conditions of the greater altitudes, he seeks the sheltered corries, or may even wander down to the comparatively moderate climate of the forests at river-level. Weeks of scanty fare, of miserable chill and cold-driving mists, fall upon him at a time when he is all too poorly fitted to meet such conditions, and, unless artificially fed, he may sink into a pitiable state of weakness. Stags have been known to fall in the act of crossing comparatively shallow torrents, and, too feeble to rise, to perish miserably within a few feet of solid ground. They have also been known to become too feeble to shake the snow from their coats, and, the first layer freezing solid, another rapidly collects, and yet

another, till the accumulating burden weighs the wretched creature down to die in its own tracks.

Such is the temperament of the red deer, such the conditions under which it normally lives, that in endeavouring to estimate its powers of reproduction a very liberal margin must be left for death by circumstances more natural than ball and powder—that is to say, if not protected by man, the red deer of the north country would be only just able to hold their own against starvation and the elements; and so vigorous is the life they lead, so subjected to periodical fluctuations of strength and vitality, that it is hardly reasonable to suppose such a life would prove remarkable for its durability. In addition to the rutting season there is the drainage of an annual growth of antlers, the development of which must be a process as irritating and trying to their wearer as the cutting of teeth to human children; so that, all things considered, it might be conjectured that the hinds stand a far better chance of long life than do the harts.

Particularly difficult is it to lay down hard-and-fast rules with regard to the red deer, for their environment controls their habits, and therefore to attempt to be conclusive is to invite criticism. Some deer live on the bleak mountain-tops, while others spend the whole of their lives in sheltered woodlands. In all cases, however, they seem to be more susceptible to misfortune than are roe-deer.

The red deer that dwell in sheltered woods naturally live at a more easy-going rate than do those of the highlands. Whereas a highland stag may begin to show the first signs of senile decline by the steady deterioration of his antlers after his fourteenth year or so, the antlers of a woodland

stag may be at their zenith of development in his sixteenth or seventeenth year, and thereafter the rate of decline may be very much slower than is the case with the mountain-stag. Naturally, therefore, one concludes that the animal living the life of shelter and plenty far outlives his kinsman who has chosen the bleak and hungry heights as a habitat.

A mountain-stag exceeding twenty stone in weight is considered a good one, and it is noticeable that the heaviest stags killed are invariably those which have chosen their home-range with a view to shelter and plenty. Thus a woodland stag killed at Atholl scaled thirty stone six pounds, and another outlying stag killed on the same estate tipped the beam at thirty-four stone—much higher weights than are to be found in the deer forest* of Atholl.

A horse lives thirty years, but does not reach maturity till six years of age. How are we to judge the age at which a deer reaches maturity? Very young stags endeavour to consort with the hinds; but mild flirtations of this kind occur in animal life of every kind, and are certainly no indication of complete maturity. Probably a stag is not fully matured till his third year, which would argue that his allotted span of life is considerably shorter than that of the horse. Gestation in the case of the horse lasts 11 months; in the case of the deer eight months; and, moreover, horses suffer none of the fluctuations peculiar to deer, so that all presumption is in the direction of the horse outliving the deer. The camel outlives the horse by at least twenty years; its period of gestation is

* It should be noted that a Scottish deer forest is not usually wooded but is merely a large, almost barren tract.

the same, and it reaches maturity one year later. So much granted, it may be added that all the evidence we have seems to show that the period of gestation has no bearing upon the length of life, for some animals are born at a far earlier stage of development than are others. The grizzly, for example, undoubtedly outlives any creature dealt with in this book, yet the period of gestation lasts only six months, the mother being denned up in her hibernation when the birth occurs, and remaining so for a considerable time after. A grizzly cub, when born, weighs less than two pounds, the weight of the adult being probably six hundred pounds; yet, though the grizzly may live to eighty or ninety years of age, it has reached maturity by its third year.

By reason of these facts we realise the impossibility of arriving at any basis by which the allotted span of an animal's life can safely be estimated. The weasel family alone provides a chaos of contradictory facts calculated to produce a sense of mental paralysis, and the 'cervides' are no less confounding. There is no logic in the ways of nature. The pace at which an animal lives, the abundance or otherwise of its chosen food, and its fertility, are factors which to some extent determine how long it can hold out against its foes, which normally is the only condition which decides its length of life. It would seem to be a provision of nature that the wild stag ceases to play any considerable part in the reproduction of its kind ere it reaches twenty years of age, and how long it exists thereafter is dependent upon conditions. It no longer figures in a capacity that is of any consequence to the community to which it belongs; that is, it is no longer able to hold out against its

foes, and therefore, by nature's order of things, has ceased to live. But that the wolf and the bear are gone, a stag that had been driven out by younger stags owing to its age would be singled out for the special attentions of its animal foes, and having no friends at hand to help, would perish.

In Scotland we have no technical names in common use to distinguish deer of various ages, but confined deer are designated as follows:

Males and females less than one year old are called *Calves*.

The male after one year old is called a *Brocket*.

A male at three is called a *Squire*, at four a *Staggart*, at five a *Stag*, and at six a *Warrantable Stag*. He may afterwards be called a *Hart*.

The female between one and three is called a *Hearst*; at three she aspires to being a *Young Hind*, and thereafter a *Hind*.

Immature males are recognised by their antlers. A Brocket has only upright knobbers, with occasionally small brow antlers. A Squire has good brow antlers and upright. A Staggart has brow, bay, tray, and two uprights. At five a stag is complete with all the above, and the cup is well formed; at six there may be a third upright branch from the cup, and thereafter the heads vary considerably. A hornless stag is called a hummel.

ANTLERS.

This difficult subject has been dealt with so fully by numerous students so much better qualified than is the present writer that he has decided to deal only passingly with this most absorbing question of the red deer's history.

The antlers of deer are very closely associated with matters appertaining to sex, though in just

what way it is difficult to ascertain. Castration has an immediate effect upon the antlers, though as to exactly what this effect is writers on the subject appear to disagree. At one time it was thought that if castration takes place when the animal is too young to have grown horns, they never grow; if when the horns are grown, they are never shed; if when they are shed, they never grow again. No doubt the effect is not always the same, for Judge Caton has shown us that a buck castrated when his antlers are nearly grown will shed them within thirty days, and that next year he will grow a new pair which never harden. They remain full of life till frozen or broken off, and thereafter the stump will grow larger, and though a new antler may be projected, it will never develop. However this may be, the evidence is sufficient to show that the antlers are sexual appendages, and any injury that may befall the sexual organs of a deer is at once recorded on the antlers, and may recur with each year's growth from that time on. When a deer is found with one crippled horn, the deformity can generally be traced to an injury on that side of the animal's body, which has directly or indirectly affected these organs.

Red deer shed their antlers annually. As a rule they drop in April, sometimes in the Highlands as early as February. The Cumbrian deer seldom shed their antlers until April, and an immature stag might carry them till May.

The growth of the antlers would appear to be very considerably influenced by the feeding. Samuel Carter, writing in the *Zoologist*, makes reference to this point. Of eleven calves in captivity he had under observation, one had nine points in its third year. He considered that the fine antlers of Exmoor were due mainly to the

excellent browse in the large coverts of scrub oak, &c.

In Devonshire a stag's brow, bez (bay), and trez (tray) antlers are called his Rights; upright points on top of the horns (cup), his Crockets. The horn itself is the Beam, the width the Span, the rough part at the base the 'Pearls.' Technical terms vary both in their pronunciation and their spelling in different localities. Harts that are crowned with three points at the upper extremity of each horn are called Royals.*

Very few people have actually seen a stag drop its antlers. The incident is said to occasion the animal much surprise and bewilderment, and having dropped one antler, it is said to bound away, as though fearful of what is about to happen next. It may be some days before the second antler drops, and occasionally a deer may be watched browsing with its antlers so loose that they are perceived to move. One curious fact remarked upon by almost every student of the red deer is that very few antlers are found compared with the number that are shed. This may be due to the fact that they very soon bleach, and assume the semblance of a dead and barkless elm-branch, and when most of the antler as it lies on the ground is covered by leaves or vegetation, it requires very keen sight to detect it. I have myself stepped on a shed antler, and not till it rose beneath my foot, casting off its partial covering of leaves, did a second scrutiny reveal what it was. Deer are fond of gnawing dead antlers, or any kind of bone substance for that matter, but it is not reasonable to think that they com-

* A much abused term. Most commonly any 12-pointer is designated a Royal, but a stag with less than 12 points may be a Royal, and certainly there are many 12-pointers which are not Royals. The finest heads in the forest were originally preserved for Royal sportsmen, and one of the conditions of qualification was that the cup should be sufficiently developed to carry a gill of whisky.

pletely consume all the antlers that are shed. It may be that they gnaw off most of the upstanding points, so that the antler lies flat on the ground, and thus escapes detection; for in localities where the water is short of bone-making elements, hinds and stags will unite to gnaw persistently at any antler found lying about.

Seton comments on the similarly mysterious disappearance of the antlers of the elk in Montana. He says: * 'What becomes of these wonderful growths? Why is not the forest littered with them, since they are dropped and renewed each year?

'Firstly, the forest *is* littered with them to some extent in districts where the Elk abound. In several parts in the West I have seen small garden fences made of the cast-off antlers, and I am told that in California it was common to see a rotten survey stake replaced by a pile of elk-horns, which were the handiest and most abundant substitute. But still their numbers are nothing compared with what one might expect. If they were as durable as stone, they would be as plentiful as stones in an ordinary Montana valley. The explanation is that they are easily destroyed by the elements, and are habitually preyed on by mice and other rodents. In all the thousands of shed elk-horns that I have picked up or seen in the West, I do not think I ever saw one that was not more or less gnawed by Mice, Rats, Gophers, or Porcupines.' He adds that, as Caton long ago showed, 'while bone is one-third animal matter or gelatine, the antler substance is about thirty-nine parts animal matter and sixty-one parts earthy matter of the same kind and proportions as is found in common bone;

* *Life Histories of Northern Animals.*

besides which, the inner structure of the antler is exceedingly porous or cellular. "Soon ripe, soon rotten," is a north of England proverb that has a bearing in this case.'

The same convincing explanation may be satisfactorily applied as regards the antlers of red deer in this country, and what appeals to me as infinitely more extraordinary is that the carcasses of deer that die from natural causes or wounds are so rarely reported to be found by man. The carcass of so large an animal would naturally advertise its whereabouts; yet how rarely one finds a dead deer! Occasionally the bodies of deer that have been killed by blizzard or avalanche, or that have died of starvation, are found by foresters; yet hundreds of deer die naturally, and doubtless, like many beasts of the forests and hills, they creep away and hide when the lassitude of death falls upon them. By far the heaviest mortality among stags occurs towards the end of April, just before they cast. A great number of stags appear to die of heart failure, several instances of which I have noticed during recent years. I have counted as many as nine dead stags lying within a radius of one mile—all having dropped during April and early May. This was where the herds concentrated in passing down to a grass pasture above Old Blair, where often as many as six hundred stags could be seen in the dusk of evening till quite late in the spring—till, indeed, the green grass was growing in the corries.

To return to the subject of antlers—for a time the stag carries two red, raw patches at the points from which the old horns have dropped, but at the end of about ten days the points swell up and the new horns are projected. At this time the stag

is probably living a quiet and secluded life. He may move about in consort with a younger stag, or with a favourite hind with whom he has previously mated, finding his companion's alertness conducive to the rest and quietude he craves, as it saves him the trouble of watching. He is painfully conscious of the soreness of his head, and if a small dispute has to be settled, he uses only his forehoofs and perhaps his teeth, the latter being brought into play in much the same manner as a horse uses them. In many forests the stags are together in great herds till the new grass comes, when the herds show a tendency to break up as they return to the high country.

All spring the red deer devotes to the growing of new antlers and the laying on of fat. When first they come the horns are covered with soft, steel-gray velvet. They are charged with blood and nerves, and are very sensitive to injury. If held in the hand they are found to be hot, and must at this stage be a source of continual anxiety to their wearer. I have handled the budding antlers of a tame elk, and the animal seemed to enjoy having them gently rubbed. A keen frost during the time that the new antlers are growing must cause the animal extreme discomfort, for they are so sensitive that the elk referred to used to shake his head in an irritated manner if the beam of his horns was quite lightly tapped with the finger-nail.

Later in the season the blood recedes, as the sap recedes to the roots of a tree in autumn. The outside velvet dries, peels, and for a time hangs from the now fully developed antlers in untidy ribbons. The animal cleans them by constant rubbing against branches, bushes, the end of a broken rail,

or any other object that comes handy. By this time the new horns are about three months old, and they are carried for just so long as the hind carries her calf.

A span of about forty inches is perhaps the average that the antlers of the red deer of this country attain.

VALUE OF ANTLERS.

Of what value are these kingly growths towards the cultivation of which this noble animal devotes so much of its life? If it were that the deer with the finest antlers was best able to hold his own against other stags, thereby producing more offspring than those less well able to defend themselves, nature's scheme would at once be evident; but this is not so. In fighting, a stag's brow antlers are the only points calculated to be of use to him. With these he may inflict a mortal wound, but the whole vast superstructure is merely so much weight and hindrance. It can, indeed, be used as a lever against him, and so prove his undoing. A stag burdened with heavy antlers is no match for a polled stag, and hummels or hornless animals are yearly becoming more common. These stags come off best in the supreme contests for possession of the hinds, and to-day on many reserves it is no uncommon thing to see the hornless harts in possession of the largest harems. These hornless stags attain greater weight and strength than do the alleged kings of the forest—which supports a foregoing statement to the effect that the annual cultivation of new antlers is a severe drain on the animal's vitality.

Since, then, it is proved that the crowning glory of the red deer is more of a hindrance than

a help in the attainment of the end for which they would appear entirely to exist, it would seem to our crude reasonings that nature is guilty of yet another blunder. The horns are sexual appendages, yet their existence defeats sexual aims. If they are purely decorative, then they fail in that respect also. Nature does not waste valuable material on ornaments that are not appreciated by the species on which they are bestowed; for example, the red back of the male shrike is to attract the eye of the female shrike, and not to decorate the woods for the advantage of all interested therein. The hinds do not appreciate the antlers of a royal head, or they would not meekly follow at the heels of a hornless rival.

It may be argued that such spreading antlers were designed by nature to present a wide front of defence to the massed attack of wolves, the stag, turning at bay, thus being able to defend his flanks or even the hinds cowering behind him. To this I would reply that the closely allied Whitetail deer of Canada, which is more harassed by wolves than any other creature on earth, is designed by nature to go hornless during the very season when attack from wolves is most likely! A good vigorous Whitetail sheds its antlers in mid-December, and wolves hunt in packs at least till the end of February. In fact, it is realised by the Indians that wolves are more likely to prove dangerous during January and February than at any other time of the year—the very season at which the deer have no horns wherewith to defend themselves! It may further be added that though the antlers of the Whitetail are far more effective as stabbing weapons than are those of the red deer, a hunted stag seldom or never turns to

face the wolves. It runs till it dies, or is thrown in the open, and there is no question whatever of its defending itself in any way other than by speed.

As weapons of defence against the wolf-packs, then, antlers can be written off as worthless. The deer that turns at bay is just as surely doomed as is the deer that falls exhausted in the snow. Speed and stamina are the only weapons it has against wolves, and heavy antlers handicap the deer from the outset of the chase—not only by their weight, but by forcing it to make many a detour to gain wider gaps in the timber. Far from the antlers being protective, it may indeed be that the protection lies in the shedding of them before the wolf peril reaches its zenith!

Of what possible value, then, are the spreading antlers of the red deer and its allies?

The male of many polygamous creatures is elaborately adorned, and may possess some attribute for which we can find no explanation as having been evolved for the benefit of the individual, though truly it may be beneficial to the race. In the case of the deer a stag killed is nothing, but a hind killed means a direct loss to the race.

The stag himself is well aware that his antlers are his betraying feature—that they mark him out as one apart, and for the special attention of his foes. When alarmed, he will hide himself in the midst of a parcel of fleeing hinds, and run with his neck extended, his head held low, so that his towering points no longer serve as a landmark proclaiming afar—‘There is a *Stag*.’ Does not this instinctive striving on the animal’s part, his immediate impulse to skulk low and so hide his head, seem to suggest that the head is there for

reasons which, though beneficial to his kind, are injurious to his own personal welfare?

One of the most striking examples of individual adornment, actually betraying and destructive to the wearer though of benefit to its herd, is provided by the white discs of the antelope. When antelope are feeding normally their white stern quarters are not specially noticeable, but immediately one of them becomes suspicious or alarmed every hair stands on end, and the disc can be seen miles away as it catches the light. Simultaneously a musk gland located in the centre of the white marking comes into play, so that should the visible warning fail, the scent warning is there as a double assurance. Nothing could be more betraying to the individual antelope than this highly developed method of communication, yet its value to the race cannot be questioned. Here, then, we have an example of the individual having acquired an attribute solely for the benefit of those around it, yet by the accepted theory of evolution it is impossible for any living creature to have acquired a marking contrary to its own individual welfare. The antlers of the stags are sexual appendages, and it is probable that, strength of sex having prevailed, the antlers have developed accordingly beyond useful proportion. In other words, the most vigorous and best sexually developed stags have naturally played the greatest part in maintaining the race, and this process of selection has resulted in the strong development of horn.

Antlers taken from the peat bogs often greatly exceed any of the heads of to-day, and there is a general outcry against the marked deterioration of heads. This is a big subject and hardly comes

within the scope of the present work, but there can be no doubt that the heavy and indiscriminate killing of yeld hinds has a great deal to do with it. The hind that runs yeld for a season or two invariably produces a good stag calf when she breeds again, and is well able to nourish him.

THE RUT.

By early October the harts have reached the zenith of their majesty, and now the lonely corries begin to reverberate with the challenging echoes of rival stags. Some idea as to the strength of the stag can be judged by the volume of his roar. It is one of the most inspiring sounds in wild nature. Under normal conditions it can be heard at a distance of two miles; but if the atmosphere be favourable, and the stag below the listener, it carries a considerably greater distance.*

In Scotland early frosts precipitate the rut, but normally it begins early in October. The stags then start to swell in the neck, and to roll restlessly in peat-pools. In these days the big king stags are in possession of all the hinds, the seraglio numbering from twelve to forty, and until the rut begins to decline fights are rare, the big stags being too wise to face each other. It is only when the young stags begin to butt in that the real turmoil begins. The rut lasts about a month, towards the end of which the older harts go off to places of seclusion, leaving the hinds to younger beasts.

Beautiful at any season, the stag is truly an impressive beast when the glory of his purpose reaches its height. He becomes hunched in the

* Across water I have heard it at a distance of eleven miles.

back like a greyhound; he roams from point to point, roaring incessantly, watching, listening. The cracking of a twig, and he freezes in his tracks, one hoof outstretched, antlers aloft, nostrils gaping wide. He may swim to distant islands in pursuit of his desires. He is prepared to trample any moving thing into the earth—prepared and ready to match his strength with that of any rival hart. He digs his antlers into the earth, tosses high the ling-roots, and roars. He rolls his eyes, and throws himself into his wallows, rolling grotesquely and with savage energy. He emerges slimy and dripping, and swings into a stiff-legged stride as an answering roar rumbles over the brow.

On the other side the two rivals meet. They approach with parallel sweeps, testing each other's scent, while the hinds stand watchfully by, ready to throw in their lot with the victor. The rivals meet with a clash of antlers, and the moonlight flashes on dilated eyes and madly ploughing hoofs that cut the soft earth into furrows. Striving with all their strength to outpush or outmanœuvre each other, one at length obtains the advantage of a sound footing. The other is forced to his knees, the leverage of his long antlers is used against him, but by a terrific sidelong and backward bound he manages to extricate himself. Again the clicking antlers fill the corrie with echoes, and the contest goes on, until, fairly weighed in the balance together, one knows himself to be the victor, and the other knows himself to be vanquished.

The latter disengages and bounds away, the master-stag in hot pursuit. The vanquished hart circles round the hinds, reluctant to leave them,

till in the end he is forced to take to his heels and seek his fortune elsewhere. The hinds then follow the victor—not probably because they are moved by any special sense of admiration, but because they know very well that if they endeavour to do anything else they will be gored and beaten by their master till they acquire a becoming sense of conformity to the rules.

But for so long as the hart holds his harem, the hinds are a source of unceasing anxiety and vigilance. Every hart in the range is ready and waiting to fight him for possession of them, and the difficult task of retaining what he holds is now his lot. He has no chance of resting, no time even to eat. In the offing dallies a litter of younger stags, who, between bouts with one another, are ever ready to poach on his preserves. He may encounter a larger stag already possessing a harem outnumbering his own, in which case all the wives are pooled, and the winner takes the pool.

The red deer is not essentially a beast of the mountains. It is merely that the vast mountain retreats are the last place of sanctuary in which it has been able to retain its footing. Thus the wild grandeur of the hills adds no little to the romance of a romantic existence. On more occasions than I can recall, when sleeping in the mountains, I have heard stags roaring and grunting all round, till the air of the glen trembled with the majesty of the sound.*

Normally, red deer are silent beasts. Almost the only sound they utter in communicating with each other is a sharp bark, very closely resembling

* On dark still nights I have been within forty feet of challenging stags which were using their antlers on the ground, but have never known one to show the least signs of aggression.

the startled bark of a terrier. In this way they give the alarm, and when a company is separated, they reunite by signalling their whereabouts to one another in the same manner. Hinds more commonly utter it than stags.

THE YOUNG.

Barren hinds are called Yell or Yeld Hinds. They come into season when the harts go out, and are better eating. They can be distinguished from the breeding hinds by their sleek and compact figures; and much as I enjoy a day's hind-shooting, it always seems to me a waste of good beasts.

Generally the calf is dropped in deep heather, and left hidden till evening, when the hind, having assured herself that all is tranquil, goes by devious ways to feed it. Though apparently she leaves it all day, she is never far away, and should the little one utter a cry of distress she at once appears, wide-eyed and stamping, prepared to fight valiantly in its defence. Her attack, too, is very formidable, for she can use her sharp forehoofs with deadly effect; and woe betide the wild-cat or prowling dog that falls foul of her defensive!

The young are born with an instinctive faith in their protective colouring. The mother makes her calf lie down by pushing it with her nose and patting it with her forehoofs; and when she has left it, it will not stir on the approach of danger until actually touched. It is then up in an instant with a bleating cry to its mother. When crouching, it lies with its neck stretched out, its head upon the ground, and only its bright eyes are likely to attract notice.

A very young fawn does not recognise danger. It has to be taught by its mother the fear of man. If found and gently handled, particularly if allowed

to satisfy its burning desire to suck one's fingers, it will follow like a dog, and may prove very difficult to get rid of. This condition of affairs exists, however, only for the first few hours of its life. When once the hind has been back and fed the calf it cannot be handled, though it may remain motionless till almost touched. At the last moment it is up and away, and already its speed is such that it takes a fast dog to overhaul one.

There is no more beautiful and graceful creature than a little red deer calf. To look at it is to lose one's heart to it; and when older and able to scamper after its mother, it is indeed the fairy spirit of the mountain-dells materialised.

A mountain-hind generally begins to breed in her third year; that is, she consorts with the stag when two and a half years old, and gives birth to her calf the following summer. Most of the calves are born in June or early July, the earliest offspring appearing towards the latter end of May. Two at a birth is very unusual, though it occurs sometimes, and, according to the Rev. H. A. Macpherson, was by no means uncommon with the Martindale deer. As a rule, hinds living in a wild state do not breed annually, though this would appear to be dependent upon feeding conditions. A tame deer may breed annually after maturity; and at Hatfield Broadoak Forest a hind produced offspring annually for ten years, though she apparently paired with her own progeny.

I have known an old hind to be accompanied through her life by her own hind offspring, she and her children composing a small herd numbering as many as six, five of them adult, but bearing some unmistakable family marking. A master stag will not tolerate the presence of an immature

hind in his herd unless accompanying its mother, but he may entertain quite friendly feelings towards an immature stag. This is contrary to the opinion of many writers, but is the result of close observation over a number of seasons. Often the master stag has a special stag calf friend.

Food.

In feeding, the deer is more omnifarious than sheep and cattle, and its food depends considerably upon the country in which it dwells. Red deer are particularly partial to nettle-roots, which possibly are medicinal, and, in common with all split-hoofed animals, salt is essential to their welfare. They will visit the coast in order to lick the brine-coated rocks. When hard pressed in winter, deer have also been known to congregate upon the sands in order to feed on seaweed; but this is taken in quantities only when the stern alternatives are seaweed or starvation.

In winter the food of the Highland deer is not widely different from that of the reindeer. They scratch away the snow with their hoofs in order to get at the mosses and lichens below. They are fond of heather, but the bright-green, short-bladed grass that caps the mounds by mountain-rills is chief among their foods. Coarse bent is also eaten.

In woodlands the deer eat leaves and green shoots of almost any kind, and in winter mosses, the bark of trees, and even fungi.

Ever since the deer were preserved as beasts of the chase they have maintained a lively notoriety for their depredations upon crops and farm produce of every kind. Standing wheat and root-fields have a special attraction for them, and the task of adequately fencing in the plots that they have

once visited is by no means an easy one. The deer come silently at dead of night, and finding their usual way of access closed to them, quickly seek out another. If one lies in waiting for them, it is probable that the only glimpse one will obtain, after hours of chilly watchfulness, is that of towering antlers silhouetted against the sky, and in a moment gone.

There are many cases on record of deer devouring snared rabbits, and even of their striking down grouse and eating them. The canine corner teeth bear evidence of a once carnivorous diet.

HABITUAL WARINESS.

Among all creatures of the hills red deer are the most wary, ever ready to take the cue from the other denizens of their habitat. The sight of a fleeing hare in an instant sets the herd on the *qui vive*, watching the skyline in the direction from which the hare came. Even if nothing further happens they remain suspicious, and soon steal off to some other feeding-place.

The curlews, the most solicitous sentries of the hills, are invaluable to the ever-watchful deer; the green plovers and the grouse are likewise their valued guardians. The red deer never miss an alarm, or ignore the warning of others. The faintest suggestion of danger, and one hind or another instantly raises her head; and should the alarm be repeated, her agitation is at once communicated to the others.

The large stags seldom depend upon their own vigilance. They depend upon the hinds; or, if two stags live together, the smaller does the watching. Similarly, the master-stag is seldom the leader of the herd, though if a tight corner be encountered

his greater boldness probably causes him to move to the front ; and when he breaks, all the hinds will follow him, even though it be through a whole line of beaters. Usually the leader of the herd is an old hind who has previously impressed the others by the soundness of her judgment, and she it is who sets the routine for the rest, leading them from hill to hill, or perhaps to some distant salt-lick. Her selection is by universal suffrage, and, once having attained to the place of eminence, her decisions are accepted without challenge.

COATS.

Hinds cast their winter coats from May onwards, though a hind in poor condition may still be carrying her old coat, or a part of it, as late as July. The stags begin to cast their coats immediately their horns are shed, and the new coat appears seldom later than June. The colour varies, and the shade of the eyes varies with the coat. In this way we have distinct clans; but, generally speaking, the deer of low countries are lighter than those of the heights. White deer are rare in Scotland. In winter the colour of the stag and the hind alike is a general brown, shading off into gray, especially about the face, while down the spine there exists a ridge of much darker hair. The belly and the inside of the ears are generally pure white.

These white ears, with their black rims, render the animal very conspicuous amidst certain settings. In summer the correspondingly darker patches are a rich, reddish gold, sometimes very beautiful in a prime animal. In the case of the stag the jaws and the neck are heavily maned, the longer hairs being tipped with glossy black, and the face is often very richly coloured.

In Atholl I have noticed young hinds more vividly red than in any other deer forest of the kingdom.

WEIGHT AND DIMENSIONS.

The Rev. H. A. Macpherson wrote that the Martindale stags attain 22 stone, but that a stag of 18 or 19 stone is considered a good one. This is a fair estimate for Scotland also. Some authorities set down the weight of a good stag as being 400 lb.; but this is a big beast, and greater weights are suggestive of woodland breeding or of intermixture of German blood. Stags have been killed at Atholl well over 400 lb. in weight, but such figures are exceptional. The average mountain-bred stag does not exceed 224 lb.

The hinds are markedly smaller than the harts.

A 300-lb. stag will stand close upon 4 feet at the withers; but hinds do not normally exceed 3 feet 6 inches.

TRACKS—SOME TECHNICAL EXPRESSIONS.

A stag that leaves a slot fully two inches at the heel is worthy of the huntsman's attention. A track three inches in width, and deep and heavy in proportion, is that of a large, fine animal scaling well above the average. It indicates an old and heavy hart that brings his hind-feet up to the impression of his forefeet.

The track of the hind is longer for its width, more pointed and more elegant, than that of a stag—the latter, indeed, can be distinguished by its comparatively blunt, round tip.

The following terms are used in connection with deer. Where a stag lies down is called his *harbour*; his favourite haunt is called his *lair*. The swampy

spot where he rolls himself is called his *soiling pool*, and it is not a very pleasant place. His breaking-place over an enclosure is called his *rack*; when he goes to water he is said to be going to *soil*. A hunted stag that turns back suddenly is said to have *blanched*; a wounded stag is said to be *cold*. When a hunted stag goes to water and lies down, or hides under the roots in a pool, he is said to have *sunk* himself.

The terms vary, of course, according to locality, and in many places most of the old technical phrases have gone out of use.

Normally a deer runs up-wind, so that it is forewarned as to what it is approaching; but a stag pursued by hounds generally runs down-wind if there is any chance, so that he can scent the hounds, while they cannot scent him. When he goes to his harbour he goes down-wind, then lies with his nose 'watching' his back tracks, and his eyes in the opposite direction.

Above all things the red deer is a master of woodcraft, and it can hardly be questioned that deer-stalking is the finest and noblest sport our island offers.

THE ROE-DEER, OR THE ROEBUCK.

THIS interesting little woodland deer has managed to hold its own in a completely wild state throughout great areas from which the red deer are long since gone, and it can be said to be fairly evenly distributed throughout the Scottish mainland. In the Lowlands it is particularly abundant to the west of Dumfries, and it is to be seen almost any day in the forests of Kirkcudbrightshire and Ayrshire. In the Highlands it has, of course, free run of the wild. It exists also in Cumberland and the New Forest.

With regard to the last-named reserve, fallow deer are perhaps most characteristically representative of the deer family, though roe are probably most abundant. There are few red deer in the Hampshire Forest, and those that exist there confine themselves chiefly to the north end of the reserve.

We have not far to search for the cause of the survival of the roebuck. In the first place, it is a woodland deer, and therefore is less subjected to the weeding-out process inflicted by the elements than the red. It is hardier than the fallow, which probably would not survive in this country very long unless artificial means were resorted to in the way of winter feeding, though the Dunkeld fallow flourish wonderfully. The chief reasons for the roe's comparative abundance are, however, that it carries not the noble head of its congener, and that it is regarded by country-folk as hardly worth killing as an article of food. So little molested, indeed, are the roe-deer in most of the Scottish forests that in the ordinary way they are quite easily approached.

I have particularly noticed, however, that whereas one can walk through the woods on Sunday and see more roe-deer than one cares to count, there is never a deer to be seen when one is cover-shooting, and the sound of a shot has once disturbed the echoes.

I remember, after an afternoon's random pheasant-shooting, we passed homewards through a strip of covert where we were accustomed to seeing roe-deer daily; and on nearing this strip a member of the party asked our host if there was any objection to his taking a shot at a roe. 'No,' the host replied with a covert smile; 'you may shoot all the roe-deer you see.'

Exactly what sport was to be derived from shooting at a half-tame roe-deer with a shot-gun is difficult to understand, and when such an incident occurs it is usually a matter of necessity rather than sport. Roe-deer multiply very quickly, and unless killed off by some means or other are capable of considerable destruction, while they do little to pay their way beyond beautifying the woods. In most parts of Scotland they are not highly esteemed as sporting animals, and I have noticed repeatedly that when roe deer and red have appeared on the menu, the carver of the roe-deer, who must indeed be skilled with the carving-knife, has proved the idlest man at the board.

CUNNING.

I have often wondered what becomes of the roe-deer when the woods are being scoured for other game. Where do they hide themselves? At one time we used regularly to walk up a narrow covert completely surrounded by open moorland. It was a favourite haunt of many roe-deer, but when the guns were astir, traversing the wood from end to end, not

one of them was ever seen. The natural conclusion was that they left the wood at one end immediately the sportsmen entered at the other; but that this was not so I satisfied myself. To have evacuated by the north end of the wood when we entered at the south would have meant that they had no alternative but to face the open moors, which in that direction rose to a tremendous altitude, and were unwooded for ten or eleven miles—until, indeed, the next valley was reached, which was entirely out of the home-range of this band of deer. Moreover, a hind living at that end of the wood told me that he had never seen them cross the hills. Therefore, either the deer left the wood by a break in the surrounding wall, and doubled back till they were behind the line of advancing gunners, or they took cover where they were and allowed the gunners to walk over them. I rather incline to the latter view, as I have heard a deer, disturbed by a dog, break cover behind us, in which case we are afforded an example of sagacity on the part of the roe which is worthy of special notice. Unfortunately I never knew this wood to be systematically beaten, or I might have obtained some clue to the mystery.

If, then, the roe-deer, on knowing itself to be in danger, seeks out the densest cover and crouches there like a hare, remaining hidden till the danger is past, when it steals out and retires swiftly to safety, we may consider that therein lies one of the secrets of its survival.*

At one time I spent many fruitless days in attempting to photograph roe-deer in their natural state, and during this experience I was impressed not so much by their cunning—for in some respects

* When shooting near Loch Tay I saw a roe creeping through the woods flattened down like a cat, and keeping to the densest cover, so as to get behind the guns.

they seemed most foolish—as by their possession of a subtle instinct which rendered them almost impossible subjects for the photographer. I was tolerably familiar with their breaks, runways, and resting-places, which they were seen to use daily. On an appropriate occasion a camouflaged cotton-thread, invisible to the human eye until it was actually touched by the hand, was stretched across their path. The camera was then hidden twenty or thirty yards away; on one occasion it was built into a wall, on other occasions it was literally buried in bracken and moss, while every precaution was taken against tell-tale scent. Regularly a box to curtain the camera was hidden for the deer to become used to long before the camera was placed inside it.

Immediately the cotton was touched the shutter of the camera was electrically tripped, but I never succeeded in inducing the deer thereby to make an exposure. True, we got several photographs—one of the keeper, one of his dog, and an excellent likeness of the local rabbit-catcher, but never of the roe. Many times I have watched them approach to within a few feet of the cotton, then turn hesitatingly aside, leaving their beaten runway to cross the burn by a seldom frequented break.

The keeper on this particular reserve told me that in the days when it was customary to trap hen-pheasants by means of the slide-door and a long length of cord, he has repeatedly seen roe approach the cord till they almost touched it, then suddenly turn back. What, then, the roe lacks in sagacity it certainly makes up by the possession of an uncanny suspicion and quickness of conception.

The only occasion on which I knew a roe to break the thread in circuit with the camera was one winter's day after a light fall of snow, and on that occasion, unhappily, the weight of snow on the thread had operated the shutter only a few seconds before the passing of the deer !

These experiences have never ceased to mystify me. It is inconceivable that the deer actually *saw* the cotton, which was no more visible than a spider's web, while being deeply hidden in the bracken. Nor was it scent that warned them, for man's scent was everywhere in the wood. On some occasions a veritable maze of threads covered the field of the camera, so that it was impossible for a deer to approach without touching one or another of them, but the only difference was that the deer did *not* approach. Yet these deer were so tame that, when unarmed, one could easily approach within ninety paces of them.

HOME-RANGE.

The home-range of an individual roe is seldom more than two miles in length ; that is, the deer lives within a mile of some central point. I have, however, known them to wander six miles from point to point ; but this is rare.

The roe-deer is a creature of more or less regular habits and regular runways, and even a two-mile range may contain many miles of visible track. Also, it will contain at least three harbours in regular use. One of these is probably an open, sunny plateau, where the bracken alone affords sufficient cover for safety, while not excluding the sun. The other two beds may be on comparatively swampy ground, in the heart of the densest

cover, and comfortable only in so far that they afford adequate shelter from the wind. At these recognised resting-places dung is dropped more liberally than elsewhere, the wild deer having no need for sanitation. The roe-deer can, therefore, be said to have at least one dry sunning-bed on its range in addition to other harbours used when the luxury of warm sunshine is not obtainable, and chosen with a view to obtaining shelter, food, and freedom from disturbance.

To and from these harbours the runways extend, and the following is typical. Coming down from the north end of the wood the deer hold the high-land, close to the boundary wall, but on the forest side, and thus on to the beech-wood. Here there is a harbour, much frequented by does with their fawns, which are very limited in range. The trail then drops to the burn-edge, and, winding in and out of the rich undergrowth, turns straight back to the northern boundary, where it crosses the burn and turns southward down the opposite bank, encompassing every willow-swamp and traversing the thickest growths of forest. Here it taps a new planting, there it encompasses a small loch, and so on till the southern boundary is again reached, when again it doubles back, keeping near the opposite border, and terminating finally at the sunning plateau. All the runways are, of course, interconnected, but if left undisturbed the deer keep more or less to the same paths.

Thus it will be seen that, though a roe may spend the major portion of its life within a mile or so of some central point, its trodden paths are many miles in extent; and if it set out to complete the circuit in the systematic manner just described

—which probably it never does—the task would occupy at least one day of steady walking.

MATING.

The roe-deer is distinct in that it is monogamous—or, at any rate, very much more so than the red and the fallow. A buck is not entirely blind to the charms of his neighbour's wife; he may even have two wives; but, generally speaking, he lives in consort with his own best beloved, and is entirely devoted to her.

The courtship of monogamous birds and animals is not such an elaborate affair as that of the polygamous, and the roe-deer does not roll himself in mud-pools, toss up the earth, and make himself otherwise absurd for the benefit of the community at large. Nor does he indulge to the same extent in the terrific duels common among polygamous deer—which is just as well, since the antlers of the roe are truly formidable weapons.

June is the mating season of the roe-deer. In July the bucks become very amorous, and are to be seen pursuing the does, which run in narrow circles, encompassing one obstacle, then another, while the buck persistently follows, the chase often lasting many minutes, but usually at a more or less leisurely speed. This habit of running in rings is peculiar to the roe, and is indulged in at all seasons irrespective of love interests. Captain Scott Elliott showed me an interesting example on his property near New Galloway, where the deer had trodden out a distinct ring encircling an old shooting-butt. He suspected it was the work of fawns.

The union of the roe-deer does not occur till August, but the mated couple generally remain

together thereafter. Whether or not they remain mated for life is difficult to say, owing to the fact that their respective home-ranges overlap, and to the difficulty in recognising individuals. Sometimes a doe and a buck and a fawn will be found living together in midwinter; sometimes a doe and a fawn live unaccompanied by a buck; sometimes a half-grown fawn will be found living alone. One recognises the company rather than the individuals, and, having repeatedly seen three together, it is very hard to tell, when one day a solitary roe appears in the same place, whether it is one of the three temporarily isolated, or whether it is a new and habitually solitary specimen; moreover, two parties may unite, and remain united for some days, so that out of the generous chaos and intermixture one cannot easily arrive at just who is whose. I am inclined to think that all the roe-deer of a given locality are well acquainted and on friendly terms with one another, and that the individual couples are not inseparable during the winter months, as they certainly are during the summer. An almost adult fawn may leave its parents for a brief period, and browse with other deer to which it is not related, ultimately rejoining its mother when she happens to pass that way. This I have repeatedly noticed in the Scottish Lowlands.

It is a curious fact that, though mating occurs in August, a pregnant female shows no signs of her pregnancy till late in winter, when the development of the calf begins. It is born early in May—a period of nine months' gestation, as compared with eight months in the case of the larger red deer. The fawns are spotted when first born, but the spots fade during the first year of the animal's

life, only those of the neck (sometimes) recurring with the winter coat. Generally the little creature remains with its mother till the next fawn is born a year later, and may even accompany her after that, though it does so uninvited. Hence the idea that milord sometimes has two wives may arise from his being thus accompanied by two does, one his wife and the other her fawn.

Normally the doe is hornless, the exceptions being occasional barren specimens. I have never seen a horned doe accompanied by a fawn, nor have I ever met any one who has.

FOOD.

The roe-deer is a woodland feeder. It does not appear to possess the partiality of the fallow for horse-chestnuts, nor to my knowledge does it feed to any extent on heather. I have often found signs of roe having scratched away the leaves in pursuit of some favourite root or fungus, which possibly are eaten medicinally. It lives chiefly on foliage of various kinds, and is an expert at stripping the lower branches. It can reach a surprising height by standing upright on its hind-legs, supporting itself against the trunk or some convenient limb by its forelegs. I have seen a roe stand upright on its hind-legs without any support at all, and it is a very pretty sight to see a herd feeding thus. The giant moose and the giraffe straddle down saplings between their forelegs to feed on the topmost and tenderest shoots, and it is interesting to note that these animals have developed accordingly, very high in the forelegs, and carrying their weight well over the fo'c'sle.

The roe-deer has developed an extraordinary

reach for so small an animal, and its activities in a cultivated garden are usually attended by considerable loss to the owner of the property.

In autumn the roes search out berry-bushes, and in winter they are compelled to eke out a living on swamp grasses, the tips of saplings, fungus, and bark.

FEROCITY.

A tame buck in the rutting season is as likely to be dangerous as is a tame stag, and, though a smaller animal, his antlers are very deadly weapons. Roe have been known to attack children returning from school, but when they are in a truly wild state there is nothing to be feared from them. I have repeatedly disturbed a buck in full rut in order to see if he would show any signs of fight, and though the animal has clearly resented such disturbance, I have never known one to show the least trace of aggression. A half-tame roe might prove an entirely different matter, and very often an animal that would not dream of attacking a full-grown man will prove dangerous to a woman or a child. This is particularly noticeable with sheep and cattle.

Cases are not infrequently reported of roe-deer attacking men.

COLOURING, &c.

The summer and winter coats are very distinct in shade. The summer coat, which is assumed in May, is of a distinctly ruddy tinge. Very often the dark undercoat tones down the surface colour, and at any appreciable distance the deer

appears brown. Between October and April the coat is much heavier, and seen in the winter light against a faded landscape the general impression is of dull brown.

The face-markings are very attractive and distinct. The jet-black muzzle is set off by a surrounding band of white, succeeded again by a band of black, one feature showing off the other. The black muzzle, the large, gray, black-rimmed ears, and the great luminous eyes, appearing suddenly from the undergrowth of the forest swamp, catch the eye with a most striking impression of tense alertness—no less striking, indeed, than the flashing white rump, which so often is all one sees of the roe as it bounds lightly through the undergrowth. The object of this white rump may be to assist the deer in following each other; or, again, it may be mainly to assist the half-blind fawns to locate their elders.

ANTLERS.

These vary considerably. Generally they rise almost vertically for four or five inches, then fork. The lower prong represents the brow antler of the stag, and is for purposes of defence or attack. There is a second fork two or three inches higher, the rear prong of which points straight behind the animal as it stands with head up. There are occasionally as many as five points, but three are more usual. Freak heads, including the growth of a third and central antler, frequently occur.

Of the many antlers I have picked up, none has exceeded ten inches from the coronet to the topmost tip.

The bucks have dropped their antlers by the end

of December, and by late February the new ones are almost perfect.

VOICE.

Roe-deer use their voices considerably when feeding at night-time, when disturbed, and during the rutting season when a pair accidentally become separated. The doe is said to have a bleating cry of her own at this season, which is instantly answered by the buck, but I have never heard it. The only cry I know is the sharp, barking note, which resembles strongly the bark of a dog, but which, once learnt, cannot be mistaken. The deer utter it constantly when startled and bounding off, barking as they run, the notes coinciding with the bounds, as though the impacts with the earth were partly responsible. If one becomes separated from the rest, it can be heard bounding up and down the forest, uttering the call repeatedly, and when conditions are favourable, as on a summer night, the note carries a considerable distance. I have heard it across the middle of Loch Ken, over a mile of water, the deer being high in the forest on the opposite shore.

SIZE.

About $24\frac{1}{2}$ inches seems to be the average height of the Scottish roe (buck), as compared with 36 inches in the spotted variety of fallow deer, and 47 or 48 inches in the red deer. From figures supplied me by Mr Macpherson-Grant of Craigo, good bucks work out at an average of about 50 lb.



THE FOX—'NIGHTS OF PLenty.'

THE FOX.

IN the wilderness only the fittest survive. The jackal and the wolf are gone; but because the fox is the wisest of his race, because he has proved best able to adapt himself to changing conditions, he has lived on as the lone and last survivor of his tribe.

There is only one species of fox in the British Isles, the common Red or Royal Fox. The beautiful silver, the black, and the cross fox furs, so much prized as robes of fashion, are merely northern colour-freaks of the red fox, just as the Silvertip is a colour-freak of the common grizzly. Thus a red vixen may produce cubs of different varieties, one of them being worth as much as five hundred pounds for its pelt, while the remainder of the litter may be worth only a few shillings apiece. (In North America there exists also the Kit Fox, or the Swift, which is a distinct species from the Red.)

Similarly, the strong and wiry mountain-fox of the north, dreaded by keepers and shepherds alike, is a red fox whose wild and rugged surroundings have changed his habits and his form, so that he would seem quite a different creature from, say, the foxes of Leicestershire and the New Forest.

Black fox pelts are so much prized solely on account of their rarity, for they are certainly not more beautiful than the red pelts. See our common fox in his autumnal coat, shaded with gold and russet, and even touched with silver, and you will think him the most beautifully clothed of all living things; and were he as rare as the

far northern varieties, his coat would be the apparel of kings.

SCENT.

When foxes are reared in captivity in a hunting country, the tails of the vixens are often docked before the animals are liberated, so that hounds will have difficulty in following their scent-trail, and they will thus survive to breed and multiply. Whence comes this mysterious scent which hounds so easily follow? Not actually from the tail, but from the musk-glands which are situated at the root of the tail. All animals have these glands, though in some they are more highly developed than in others. In the weasel and the polecat they are well developed—hence the unpleasant saying, ‘Stink like a polecat;’ while in the skunk they reach the zenith of obnoxious perfection, this animal being able actually to eject the musk as a means of self-defence, and a very effective means, too! By docking a fox’s tail the scent is not so readily led to the ground, and the animal is difficult for hounds to follow.

As is the case with all highly intelligent animals, foxes are much attached to their young. Fox-farming is now a well-established industry, and on these farms foxes are reared in captivity for their pelts, the original stock having been taken mainly from Prince Edward Island. Enormous prices are paid for live black and silver vixens, to be kept for breeding purposes, and some of the professional hunters of the north are not particular as to the means they adopt in hunting. They have been quick to realise the devoted motherhood of the vixen, and to profit by it. It is almost impossible to locate a litter of foxes by tracking down the

vixen, owing to the cleverness with which she hides her trail in passing to and from the den, linking up the new tracks with the old, or resorting to the densest undergrowth, where she can leap from windfall to windfall. A vixen having been located, the method most commonly employed is to run her to earth with hounds. Sometimes the vixen will not expose her cubs to danger by denning up with them, however, and sometimes trained hounds are not available, so that other methods have to be resorted to. The blood-trail is, alas! among these. The man, armed with a light rifle, lies in waiting for the vixen, and wounds her more or less lightly, so that she leaves a blood-trail. Her first thought is of her cubs, and thither she goes; but this time the old, old tricks find the human sleuth still behind her, her closely guarded secret betrayed by those tell-tale spots in the snow.

TRICKS WHEN HUNTED.

History lives in Fox Country, but Leicestershire is not the only county that breeds clever foxes. Every master of fox-hounds can tell you the history of some fox, which, surpassing his fellows in fleetness and cunning, led hounds and huntsman many a pretty chase, baffled them and checkmated them, and finally left them with a mystery to solve—nothing but a mystery!

The beginning of wisdom is in profiting by previous experience, and undoubtedly the fox does this. Reynard knows that the scent he leaves behind is the true cause of his peril, and does all that he can to break or scatter that tell-tale line. He will run along a railway track, knowing that the glazed steel and the tarred sleepers do not

retain the scent well ; and more than once he has been known deliberately to lead the hounds under the wheels of an express train, which, of course, he could hear from afar, with the result that several of the hounds were killed, and the hunt so broken up that the fox escaped to safety.

Running water is a never-failing friend to the hunted fox, and well he knows the value of it. When fishing by the river Wharfe some years ago, I heard the hounds coming towards me at full cry, and as presently the sounds ceased, I judged the chase had changed in direction. A few minutes later, however, I saw a fox daintily paddling down the shallow margin of the river, coming straight towards me. Seeing me, he turned without haste, ascended the bank, and made again for the hills ; but when, a few minutes later, a whip came galloping up and asked if I had seen the fox, did I betray him ? At all events—many another lively run did that same fox give the field !

A fox will deliberately run among a flock of sheep so as to mix and scatter his scent with theirs, and he has even been known to jump on the back of a sheep and ride a considerable distance, thereby breaking the tell-tale line.

But many a good fox who has fooled and baffled the hounds and given them a glorious run has won his freedom only at the cost of his constitutional fitness. Emerging at length from his sanctuary, after a rest of many hours, he is no longer the wonderful running-machine that he was when the hounds took up his scent, but is now a broken creature—lungs gone, heart gone, merely a physical wreck. And, again, many an exhausted fox, seeking shelter in a wet drain, lies there till, sick and chilled, and his vitality becoming low, he

falls a victim to the fatal red mange, the scourge of the fox kind. In the mountains of the north, where the rugged nature of the country does not permit of fox-hunting, red mange is quite uncommon among the foxes, simply because they are never run to exhaustion.

The enormous distance a fox will cover in a single day, leading the hounds at full cry for hours on end, tells its own story. His powers of endurance may be marvellous, but after all he is only flesh and blood, and when, at the end of hours of running, he sets out with pounding heart and panting breath for quite new country—away over the hills in a last mighty and supreme effort—we know that the end must be near. How one's heart goes out to the fox—dragging on and on with foes on every side, seen at every open gate, shouted at and turned aside, and always with that awful death-like 'music' at his heels!

Yet not always is the end of the chase a tragic one. One day we see him, in his burning need for water, drag himself into the swamps of the river-margin, the hounds hard behind, and we apprehend that ere many seconds are past his gorgeous coat will be dragged and trampled through the mire. He pauses at the very brink among the rushes, and looks half-hopefully ahead.

The river! His old, old friend, truer far than friends that change or move to distant hills! Many a time before has she served him with a generous hand—many a time away in the blue hills there, where he spent his cubhood days. Will she fail him now—now in the time of his direst need?

A fresh outburst from the hounds urges him on—he slips into the water, swiftly, silently, and

unseen. For a few paces he swims, and then, only his nose above the surface, he drifts. The friendly waters close about him, soothe his burning skin, and bear him on. The hounds, red-eyed with blood-lust, surge to the river-bank, and cross. No scent!

Is that a fox drifting down the river, far out in the central race—that limp, waving object, looking like an old cast-off garment as it moves with the tide? If so, no one sees it, or, having seen it, gives it a second thought.

Far down the river Reynard drifts, till the hideous sounds of death are left behind; then, refreshed and rested, he climbs ashore. All is very peaceful and quiet here. Just up the hedge an old cock-pheasant is scratching in the leaves, but Reynard, hardly seeing it, heads wearily for some distant spot whither no hound will follow. He heads for home, a wiser fox than before, and—free!

VOCAL POWERS.

Just as foxes are clever and original in deceiving the hunter, so are they clever and original in their own hunting. Reynard possesses remarkable vocal powers, and can imitate exactly the bleat of a lamb, the squeal of a hare or a rabbit, and numerous other sounds belonging rightly to the creatures he is out to kill. One night, when driving home along a country lane in Dorsetshire at the time of the year when young lambs are about, I heard what I took to be the bleating of a lost lamb coming down the hedgerow towards me. On my making some commonplace remark concerning the sound to the farmer who was driving me, he replied, ‘That isn’t a lamb, sir; it’s a fox. You can hear them bleating any night this time of year.’

Many seasons later I again heard the bleating of a fox—this time in the hills near Burnsall village. I was spending the evening with a shepherd in his tiny cabin out on the moors, and as we both sat at the open door, smoking our pipes before he turned in, we heard the bleating of a lamb coming towards us down the wall-side. The cry was exact, save for an indescribable sinister ring about it, which at once raised my suspicions, bringing to mind the night in Dorsetshire some years previous. The shepherd reached for his gun; but Reynard evidently saw the movement, for there was brilliant moonlight, and we just caught a glimpse of him as he slipped, flattened out, over the wall-top.

Reynard clearly thinks that by mimicking the cry of a lamb he will spread unrest among the nursing ewes, and if any ewe has lost one of her lambs she may set off eagerly towards the sound, deserting her remaining charge, which is then at the mercy of the fox.

Rabbits are often called by a fox to within striking distance, Reynard lying concealed behind a tuft of grass or inside a bush, and imitating exactly the squeal of a rabbit in pain. I have myself called rabbits to within a few yards by this means—the old bucks or nursing mothers of the colony coming hopping up, stamping, and full of foolish, goggle-eyed importance, to see which member of the community it is that has fallen into difficulties. If the squealing is kept up for any length of time, however, such is the intelligence of the rabbit that the whole colony becomes used to it, and at the end of five minutes or so they take no further notice, merely steering clear of the spot from which the sound issues.

Rats, however, are a very different proposition, and when one rat sits up and squeals, every rat within hearing is likely to hasten to the spot, so that Reynard is pretty sure of a *coup* should he consider it worth while to attempt this squealing stunt in the vicinity of a farmyard.

In Canada I one day saw a fox come out of a poplar-grove, and peering through the scrub, he caught sight of a brace of plump, snowshoe rabbits nibbling the second-growth spruce that dotted the snow-covered plateau. For a long time he eyed them covetously, evidently thinking out a scheme for bringing about their downfall. It was a difficult problem, however, for the snowshoe can skim the drifts more easily than a fox, and if once the rabbits succeeded in gaining the underbrush, Reynard would not get a look in. His only chance lay in snapping up one of them in the open; yet how? The plateau was level as a billiard-table, and, save for the thinly scattered spruce, afforded just about as much cover.

Presently the fox began to scratch in the snow, digging a trench under the juniper, and extending it out into the open towards the rabbits. Evidently he knew they would return to the grove this way, for, having extended the trench well into the open, he was content to lie concealed behind his breastwork and wait. Sure enough the rabbits began to nibble their way towards him, but at this juncture the cold warned me to move on. There is little doubt, however, that one or the other of the rabbits would fall to the fox.

In that particular part of Alberta foxes existed in most surprising numbers, and all through the night one could hear them yapping. Sometimes they uttered a long, thin, wavering howl, which

was often taken up by others, till it became a veritable concert—such as Seton describes in one of his absorbing animal stories.

TRAPPING.

The cleverness of the fox in avoiding steel traps has had no little to do with its survival in the many parts of the world where it still flourishes, but from which the wolves are long since gone. So far as one can judge, the wolf of Great Britain was an arrant ass, and of very much inferior intelligence to the gray wolf of the New World. Remnants of wolf-pits still remain in various parts of the country, and from these one would judge that the wolf population of those days was quite incapable of discriminating between the most obvious sets and the natural features of the landscape. In certain parts of the prairies the wolves and the coyotes bid fair to outlive the foxes, probably because they are less given to attempting raids on homesteads than is Reynard, confining their depredations to the less-frequented alley-ways of the night; but it is little wonder that the foxes of this country have long outlived the wolves which once ranged the same forests.

Foxes are quick to locate the scent of steel, and fear it greatly. Every fox inherits this fear, springing, as he does, from a line of ancestors to whom the steel trap has been an hourly peril; but if he learns in addition what the steel trap really is, then keen must be the trapper who is to outwit him.

There was an old fox which became an absolute pest to one tiny village away back in the Pennines, nipping up geese, ducks, and fowls in broad daylight, and defying the many efforts made to bring

about his destruction. When in the end this old fox was dug out and killed, he was found to have one paw badly crippled, having evidently left part of it in a trap years ago, which accounted for his extreme wariness thereafter in avoiding such engines of warfare.

An experienced fox-trapper, however, is pretty sure of his pelt so long as it is worth his while to persevere in the pursuit of it. There is one thing that effectively hides the scent of steel—running water. Therefore the trapper suspends his bait in the branches of a bush overhanging a stream, just so high that the fox, standing in the water, is bound to jump for it. His traps he sets in the water, directly below, so that any fox trying to get the bait is sure to encounter one of them, and having encountered it, he inevitably springs the second.

Foxes are fond of following water on their nightly forays, game being most abundant there; so another method is to set the trap in the centre of a narrow stream, covering it with moss so as to form a little island directly above the spring-plate. Baits are then set on each side of the stream, so that any fox coming along is sure to locate the bait on his side. Having taken it and found it to his liking, he noses round for more, and it is then—oh fatal discovery!—that he scents the bait on the opposite bank. A fox hates to wet his feet, and he makes a leap for the deceptive island of moss in mid-stream, when—ping! He is caught!

The commonest method employed by game-keepers in trapping foxes is to utilise the stinking carcass of a cat, placing it in such a position that the fox is sure to locate it, and setting the traps all round. A fox cannot resist the attraction of

such a bait, and in circling round he is sure to spring one or more of the hidden traps.

VALUE OF THE TAIL.

The bushy tail of the fox has many uses, foremost among which is its value as a wrap or a travelling-blanket. In referring to the foxes of Manitoba, where the cold is intense, Seton says that he does not believe a fox which has lost its tail would survive the winter; but this certainly does not apply in the British Isles. As already mentioned, vixen cubs reared in captivity are often docked before being liberated, and a tailless vixen generally lives to produce many litters. There is no doubt, however, that the tail is a considerable comfort to its possessor, for the fox, when resting, curls into a ball, its exposed nose and paws packed closely together; then it wraps its tail over them, and breathes through the long, close hair.

Thus curled, a fox is very difficult to distinguish against a background of leaves or bracken, and will lie perfectly motionless so long as it thinks itself unobserved by the passer-by—watching through the hair of its tail, which thus serves an additional useful purpose by hiding the bright eyes that might otherwise give the show away.

Foxes use their tails considerably when fighting, the combatants striking each other in the face, and thereby causing a momentary diversion which serves to cover a snap or a parry. I have heard it stated in all seriousness that a fox, before going out in search of a rival whom he intends to engage in combat, will deliberately sprawl in water, then roll in sand till his tail, and indeed the whole of his fur, is filled with grit, which so blinds his opponent that victory is easily gained!

Again, the tail of the fox is of value in assisting him to follow the lightning twists and turns of Brer Rabbit, acting as a rudder and a stabiliser; but nevertheless there are times when this generally useful piece of equipment is a severe drag. A hard-run fox that has been compelled to take to water finds his wet brush a sorry burden, and in the end the slight additional weight may prove his undoing. A badly wounded fox in Wharfedale, which was ultimately shot and killed, was found to be rendered almost helpless in its enfeebled state by the heavy load of ice which had collected in the long hair of its tail. The poor creature was evidently too done up to bite out the ice-clots, which rapidly accumulated, and in the end might conceivably have sealed the animal's fate had not a more merciful form of death stepped in.

SPEED.

I doubt very much whether the fox is so fast in a short sprint as the rabbit; 28 miles per hour is probably the average maximum, but between the maximum speed of Reynard and the speed he is capable of maintaining over a considerable distance there is but a narrow margin. Thus the prime fox, whose maximum speed is 30 m.p.h., will probably prove capable of maintaining 20 m.p.h. over a distance of four or five miles where the going is favourable, whereas a rabbit, which may attain 33 m.p.h., could not maintain 20 m.p.h. for more than five hundred yards.

THE YOUNG.

Gestation occupies fifty-one days. The young are born early in April, and are blind for about two weeks. Usually they appear at the den-

mouth when about three weeks old, but they do not venture far from the area of trodden sand till about three months old, when, singly or together, they begin to accompany their mother on breathless mouse-hunting expeditions.

In fox-hunting country, where the home-den of the vixen and her cubs is never disturbed, foxes often choose the most exposed and open place for their 'earths,' as the home-burrows are called; for instance, I have known one to be located in the centre of an open fallow field, slick on the skyline, the mound of newly turned earth vastly visible against the sky. In mountainous districts, however, where the nature of the country forbids hunting, the utmost caution is exercised by the parent foxes in the location of their den. They choose some little-frequented and almost inaccessible spot as far from human habitation as possible, knowing full well that their little ones, if discovered, will be dug out and killed by keepers or shepherds. Very often an old and abandoned quarry, which catches the sunshine, but shelters the den-mouth from easterly winds, is chosen, and here the cubs gambol when old enough to leave the den, chasing the moths and the insects about the warmth and shelter of their stronghold, while the parents, in their coming and going, take care to leave no beaten track which might betray their secret.

The dog-fox, in spite of various doubts raised on the point, is a devoted father, though while the cubs are small he has little to do with their upbringing. His share at this time is to bring food to the vixen, leaving it at the den-mouth for her; and thus, by making sure that she is well fed, he can have no doubt that her precious cubs will not be

neglected. Also, he acts as guardian of the den, making note of any strange figures that appear, and warning the vixen in case of danger. It is to be feared that in the days of spring-time plenty he often destroys more food than is needed, going out on long excursions of piracy, and earning a bad name for himself. Should the vixen meet her fate while the cubs are small, their father nobly takes charge of them, carrying them perhaps to some safer locality, and caring for them in the best way he knows.*

In the mountains of the north the parent foxes generally work their den so that a root or a boulder obstructs the entrance not far down, and here, where the burrow cannot be enlarged, they take up a stand should their home be invaded by an enemy. Very often the fox-diggers, having dug down a goodly distance, and thinking themselves near the nest containing the young foxes, find to their annoyance that they cannot dig farther owing to the presence of a huge boulder which obstructs the way, and far under which, in all probability, the cubs are hidden. Even should the diggers find the nest, they are by no means sure of the cubs, for generally there are side-pockets, or 'hide-holes,' running off in different directions, often so small that they become filled in during the digging, and so escape notice; but at the end of each of these secret corridors is huddled a little fox, who squeezed himself in immediately the digging commenced. When an enlarged rabbit-burrow is used as the earth, the

*This is not a random statement. I have known the dog-fox to return to a completely buried earth, after the vixen had been killed and the cubs dug out, and to open it; and keepers in the Highlands set traps in anticipation of the dog-fox's return. If the cubs are left, it has been proved over and over again that he will carry them away; every cowboy of the prairies knows this.—H. M. B.

foxes * generally redesign parts of it to their own tastes, filling in the unused corridors to exclude draught.

CUBHOOD DAYS.

Every infant fox is taught the lessons of life by its parents, and the cubs of a wise mother grow up wise foxes.† As soon as they are old enough to play about the mouth of the den, their lessons begin. First they are taught to use their noses; the parents, having brought food for them, hide it some little distance from the earth, and leave the cubs to locate it by their own keenness and cleverness. Thus the clever cub fares well, while the dull member of the family comes in only at the tail-end of the feast. A little later they are taught to pounce mice out of the grass; taught the folly of chasing the fleet-winged grouse that rise from the heather; and taught that, above all, stealth and cunning are the crowning virtues of the master of woodcraft.

One day their mother leads them to a new track on the hillside, and sniffing it, she bristles and growls, looks this way and that, then sneaks swiftly into the heather, keeping in the hollows, never showing herself against the skyline. Each cub sniffs the new track, bristles and growls because his mother did so, and sneaks furtively after her, fearful of some unknown peril. And after that day the scent of that track brings fear to the heart of the fox-cub, and encountering it in his rambles, he sneaks off through the hollows, for it is the scent of the watchful shepherd!

Every nursery of fox-cubs has its playthings, such

* I have seen both parents engaged in digging the burrow.—H. M. B.

† See HARE.

as the wing of an old cock-grouse, dried by exposure to sun and sand, and durable as leather. The fittest cub picks it up and 'swanks'—I can think of no better word—round with it, casting glances of defiance at his brothers and sisters till a tug-of-war ensues, the opponents snarling in a most fear-inspiring and terrible manner. In the midst of the contest the humorous cub—for every litter has its humorist—runs full tilt into the wing, knocking the others flying, and snatching up the trophy, he tears off with it, running in circles and colliding with everybody. There ensues a wild scramble, during which the surly cub loses his temper, fights in real earnest for the wing, and finally gets it. Then he carries it off, growling as he goes, and tries for the ninetieth time to eat it, so that there shall be no further misunderstanding as to whose it *really* is!

Until three or four months old fox-cubs give practically no scent at all; so little, indeed, that hounds will run over them—a very generous provision on the part of Dame Nature. At the time when they are old enough to play about the den-mouth, the vixen, evidently with the idea of widening their outlook a little, sometimes prepares for them a yard or a playground a little distance from the earth, and thither, on fine nights, or even during summer days if the place be sufficiently secluded, she takes them at regular intervals. Usually the yard is located in the midst of dense bracken, or some other suitable cover, and easily accessible from the den. The dam treads out a bed for herself at one side of the small open space, and there she lies watching her little ones while they roll and scuffle in front of her—keeping, always, to strictly defined limits. Usually they

show no desire to wander off into the whispering quietude beyond; but should one of them attempt to do so, it is at once called back and severely reprimanded.

Mountain-foxes are more given to this custom of instituting a 'home from home' than are 'long valley' * foxes—probably because they inhabit less thickly peopled regions, and are, therefore, less likely to be disturbed. Some keepers are of the opinion that in the case of the true mountain-foxes the vixen leads her cubs from the den as soon as they are old enough to follow, and that thereafter they do not return, making their home in the heather. Occasionally a shepherd crossing the hills will come across a fox 'yard' far out in the open, no *earth* anywhere near, the yard being betrayed from afar by the litter of feathers and, alas! lambs' wool. If the cubs are there, they simply crouch in the heather, making little or no attempt to escape, and a massacre follows, the shepherd's dog giving short shrift to the defenceless youngsters. It is surprising to how great an extent the hatred of the fox is born in these hardy dogs of the hills; for generations past they have shared, fang and nail, in their masters' feud.

The parents of the cubs are often very fearless and cunning in their efforts to draw away any intruder from the vicinity of the family. A friend of mine rose early one morning in the hope of catching a glimpse of a litter of young foxes he knew to be located in a certain wood. As he neared the spot where they were, stealing as

* I use the term 'long valley' to distinguish the wide, long valley of the lower basin of a river from the upper or mountain valley. The term is used in the East, and might conveniently be adopted by sportsmen and naturalists at home.—H. M. B.

silently as he could through the undergrowth, he was suddenly startled by a vicious snarl just ahead of him, and a moment later one of the adult foxes leapt from behind a bush, and momentarily barred the way, snarling and bristling. Immediately the fox saw that the intruder was a human being it slunk off, uttering as it went two sharp 'yaps,' which were evidently the signal for the cubs to retire hastily underground.

In all probability this was the dog-fox, and certainly the part the father plays at this season is by no means insignificant. No doubt in the world of foxes there are fathers and fathers, as there are in the world of human beings; but observers are too apt to conclude when a fox is seen near a den that it is indisputably the vixen, though as a matter of fact the father is generally on outpost duty somewhere near, and he is more likely to be seen than is the vixen. It is he who gives the first warning of danger, and, if possible, leads the intruder in another direction; the duty of the vixen is to hasten to her cubs, if she is not already with them, and see that they take cover immediately.

I give the incident upon which the above statement is based. A keeper in a non-hunting country (Upper Wharfedale) sent his dogs into a wood which he knew contained a fox family, taking up his station at the end of the wood near to a point at which he thought the vixen would bolt. The dogs struck the scent of a fox almost immediately, and were led hither and thither through the undergrowth for some minutes. Presently the keeper saw the vixen cross the boundary wall about two hundred yards from where he was standing, and lope across to an adjoining

wood. Her tongue was lolling, so assuredly it was she the dogs had followed, though by some trick she had now successfully thrown them off the scent.

Next day the keeper repeated the performance, this time taking up his station at the point where the fox had emerged. Exactly the same thing happened—the fox was viewed by the dogs, led them on a wild-geese chase for some minutes, then tricked them. A minute later Reynard appeared on the wall-top, crossing at exactly the same place as yesterday, and, of course, met its fate. On going up, the keeper was surprised to find that it was the dog-fox he had shot!

A Highland keeper told me that one day, when crossing a moor, he was much mystified on seeing two foxes running apparently aimlessly round and round a boulder. He thought they were chasing each other for amusement, and forthwith proceeded to stalk them. Almost immediately, and without looking in his direction, the foxes made off, keeping together for a short distance, then separating. The keeper urged his dogs in pursuit, and was about to make his way to a point of observation, from which a chance shot might be obtained, when it occurred to him to look round the boulder where he had first seen the foxes, for clear it was that they had seen him before he saw them. Going to the place, what was his surprise to find a solitary little cub seated under the rock, so young that its eyes were hardly open! The man could not find it in his heart to kill the lonely little wean—apparently the sole charge of its parents, who, the man now realised, were busy, when he first saw them, scattering their own scent about the place so as to overwhelm that

of the cub, finally running off together in order to leave an unmistakable line to lead away the intruder!

Early in the autumn, when the cubs have learnt to hunt and to take care of themselves, the family finally splits up, the fox and the vixen driving the cubs out of the home-range, this being a natural prevention of overstocking, which would result in many enemies or in scarcity of food. Each cub now sets off to seek his own fortune, and he may travel for days ere he finally settles on a range of his own. During this time of migration, while travelling restlessly from hill to hill, from forest to forest, the cub invariably carries something in his jaws. It may be an old sheep-horn or the sole of a boot, or possibly it is the last thing he killed—a water-vole or even a frog. Exactly what his idea is one cannot say, unless it is that, feeling himself an emigrant, he is constrained by a desire to carry his worldly possessions with him. More probably, however, the ruling instinct is that of carrying a small store of food lest, in his wanderings, he should encounter a fruitless land and suffer hunger.

Many foxes have little secret *caches* or hiding-places, where they bury certain things which happen to take their fancy. All manner of strange oddments are buried here—little things the fox has picked up during a night's wanderings, carried for an hour or two, then hidden with his secret store, to be meditated over in leisure hours. An old barrel mole-trap containing a dead mole, a medicine-bottle which had held some strange-smelling concoction, a bit of a slipper, and an old dog-collar were found in one such *cache*, which was located in the decaying root

of a tree in the centre of a lonely forest. Evidently the fox spent much leisure time in the vicinity of his secret store, for he had amused himself by stripping the bark from adjacent dead trees in order to nose out the grubs which lay beneath it. (Personal observation.)

LENGTH OF LIFE.

The fox is a hard-living animal, and, like all the canines, is not remarkable for longevity. He is old at ten years. Eight years is probably Reynard's allotted span of life, for immediately infirmity sets in, immediately his senses lose their keen edge, he inevitably succumbs to one or other of his foes. He is so much dependent on his sight for his living that were this to fail in the least, hunger would hasten the natural decline of his health, and if not killed he would probably, in his weakened state, fall a victim to red mange, and die a month or two later.

NUMBERS.

Taking the number of foxes killed annually before hounds in Great Britain as 12,000, and the number killed in other ways as 10,000, making up a total of 22,000 foxes killed annually over an area of 80,000 square miles, it is possible to arrive at a rough estimate of the fox population of the country. On St George Island, Behring Sea, foxes are fed and protected for their pelts. The stock consists of about 270 mated pairs, and it is found that not more than 500 pelts can be marketed annually without reducing the stock.¹ On this basis it may be argued that 11,880 pairs of foxes breed annually in Great Britain, though it is reasonable to suppose that this is a very

low estimate. In the first place, the St George Island vixens produce from 5 to 12 cubs to the litter, whereas the wild vixens of this country produce from 4 to 9. Again, it may be taken that the accidental death-rate is higher among animals that are purely wild than among those fed and protected by man, so that in all probability the stock in this country is close upon 13,000 breeding pairs.

ENEMIES AFIELD.

Afield, Reynard is no more popular than is a prowling cat in the hedgerows or a sparrow-hawk in the pine-tree. When out at night-time, I have marked his passage down from the heather into the fertile valley-levels by the frenzied calling of the pewits, circling over him, accompanied occasionally by the drumming of snipe and the wild alarm of the curlews. The pewits are truly the sentries of the night during the spring of the year, and their unrelenting watchfulness must occasion Reynard many a muttered oath as he sallies forth on booty bent. He will hide in a drain or in a stone wall in order to get rid of them, for so long as he remains visible they will assuredly follow him, one bird keeping up the vigil till it is relieved by another, and so on by mutual arrangement from field to field.

Sometimes comparative silence reigns upon the uplands. The moon is not yet out and the stars are dim. One hears the scream of a hare two fields away; it fades, and the silence closes in again like the closing of water at the stern of a vessel. Then suddenly a pewit calls. The call is answered shrilly, then repeated. Reynard is abroad, and in a minute or so the whole mountain-

side is apulse with sound, the very rushes seeming to find voice and to join in the general chorus.

SENSE OF SMELL.

The fox is gifted with extraordinarily keen sight, and, like all predatory animals capable of speed, he uses it very considerably in his hunting. His nostrils, however, are as well trained as those of the best setter or pointer. In hunting, the general trend of his direction is against the wind, and his nostrils are aquiver at every step. Suddenly he stops, head aloft, ears acock, one paw upraised in an attitude of sculptured gracefulness—freezes into a statue, save for that never-ceasing quiver of the nostrils. He moves a step or two to left or right, tests the wind again, then slowly sinks to ground. In that dense clump of heather just ahead a blue hare is crouching. He cannot see it, but his nostrils have marked it down to within an inch. He leaps, pinning down the heather between his forepaws; then a thin-edged scream goes up, a pewit rises a-wing, another follows—but what matters the hubbub, now that Reynard has procured his supper? He lopes easily away, and the night sentries mark his going, screaming aloft.

When Reynard—and, of course, the same applies to other animals—hunts by scent, he must, at every stride, ‘watch the wind.’ His exquisite sense of smell would be of no value whatever to him unless it were worked in conjunction with an equally exquisite sense of wind-direction. Scent alone could not have told him just where that blue hare lay. The scent was of a potency and a property which meant ‘two yards away,’ but it was wind-direction, and wind-direction only, which marked its exact whereabouts.

Thus the nose of a fox is not only his scent-machine, but also his wind-vane. Both functions are performed by that small, moist, cold member which leads the way everywhere. If you desire to ascertain the direction of the wind, you moisten your finger and hold it up before you. The cold side is the wind side. Reynard's nose is moist by the natural course of events, and is so sensitive that it conveys to its owner the direction of currents of air so slight that they amount merely to faint movements of the atmosphere. The most breathless days are not devoid of such movement, or, if so, the creatures that are dependent on their 'scent' for a living would fare badly. It would perhaps be more accurate if we said that these creatures are dependent upon their senses of smell and wind-direction, for one sense is worthless without the other.

When a dog becomes thirsty its nose dries, and it is said to lose its scent. Most probably its 'scent' remains unaffected, but owing to the drying of its nose the dog is no longer able to 'watch the wind,' and thus has lost its chief guidance. Keepers seem to have some knowledge of this, for I have watched a keeper deliberately moisten a dog's or a ferret's dry nose in order to assist it in locating game.

When a dog or a fox falls ill its nose becomes hot and dry. This is one of nature's remedies. A period of starvation is the finest medicine in the world, and with the drying of the animal's nose starvation is temporarily enforced, and, its hunting abilities gone, the sick creature is content to den up and sleep itself well. Thus at every turn we find nature's schemes worked out to attain a definite end.

It will be seen that the fox has many characteristics which are not unknown in man himself. We have our nurseries and our museums—so has he. His school is the great school of the woods, in which, during his cubhood days, the fox learns, lesson by lesson, the things which are to carry him through later life. If he learns earnestly, he lives; if not—well, there is no place in the Wild for the dull-witted and the foolish. The clever fox lives on the fat of the land; the fool is hungry and hunted till he falls a victim to the merciless weeding-out process that permits only the fittest to survive and breed their kind—the offspring of wise parents.

DIMENSIONS.

The length of head and body in an average dog-fox is about 3 feet, tail 1 foot 2 or 3 inches; 3 feet 6 inches is a big fox.

THE WEASEL AND THE STOAT (THE ERMINE).

THOUGH easily distinguishable from one another in habits, the stoat and the weasel are very similar, and in the following the word 'weasel' can be taken as applying to both unless a distinction be made. The stoat is much the larger, and generally a shade lighter in colour, while the conspicuous black tail-tip, fleeing always in pursuit of his sinister little form, proclaims from afar: 'I am a stoat, and not a weasel!'

The weasel lives chiefly on mice, moles, rats, and so on, and though often guilty of grave misdeeds, such as wholesale murder in the hen-house, it probably pays its way so far as the farmer is concerned. Gamekeepers, on the other hand, destroy weasels whenever an opportunity occurs, knowing that they will attack game of any kind as impartially as they will attack anything else there is the faintest chance of their pulling down, and the fact that the weasel destroys vast quantities of small ground-vermin does not exonerate him in the keeper's eyes. On game-reserves, however, the weasel is much less harmful than the stoat, as the latter, being larger, is unable to make such free use of the burrows of small rodents which perforate the fields and hedgerows; and, hunting more in the open, it makes a business of searching during the season for sitting birds, destroying the mother and the whole clutch or brood should it locate her.

Though capable of surprising destruction, the weasel is very little thicker in the body than a

man's thumb, and is designed in every way for hunting underground—invading the burrows of the smallest rodents, and negotiating them at such speed that their rightful owners, if caught at home, have no chance whatever of escape. Catching up a mouse by the head, the weasel kills it instantly, then, thrusting it aside, hurls himself furiously on the rest of the family, dealing death left and right, and never ceasing to kill so long as there is a living creature within his reach. Such ruthless and unwarranted massacre is common to all the polecat tribe. They do not kill merely what they require for food, but destroy everything that comes within their reach; thus, on gaining the interior of a chicken-house, for example, they go mad with blood-lust, killing in a few minutes enough poultry to satisfy their material needs for several weeks.

I once watched a weasel raiding a water-vole burrow in the centre of an open pasture. About nine voles, young and old, left the burrow immediately he entered it, and squatted trembling in the grass by the mouths of the various holes. The weasel, working underground, nosed them out one by one with lightning rapidity. One just saw his wicked little head dart, like the strike of a rattlesnake, from the mouth of a hole by which a vole was crouching, heard a squeal, and the vole was jerked backwards into the burrow with hardly a kick in self-defence. A second or two later the head of the weasel would appear at another hole, and the same thing would happen, the whole family being exterminated in the course of two or three minutes. I allowed this to happen because the voles were doing considerable damage by undermining the artificial bank of a stream near by, causing it to flood the meadow; but when the

work was completed I strode up and introduced the weasel to my terrier, who knew just how to handle such gentry.

Unlike the stoat, the weasel never hunts on the earth's surface if there is any possibility of pursuing his whimsical and murderous way underground. He will follow stone walls, running along inside them in travelling across open country; then, leaving the wall, he makes for a drain, emerges to follow a mouse-run, and so on and so forth, seeming to possess an instinctive knowledge as to where such shelters exist. This is all the more remarkable since this little killer never remains long enough in one locality to become properly acquainted with every tunnel and cranny. Generally he is exploring new country, with which he must be totally unfamiliar, yet when fired at, or suddenly beset by dogs in the open, he darts unerringly for the nearest tunnel, the mouth of which may be completely overhung and concealed by grass.

It may be a matter of surprise to many that so small and short-legged a creature is capable of running down animals that are much larger and more speedy than itself; but one only needs to see a weasel at work in order to realise that no animal it normally hunts has the least chance of escape when pursued, terrorised, and perhaps surprised by so unwelcome a visitor. The weasel can outrun a hare, and is bold enough and savage enough to invade a building literally swarming with large, ferocious house-rats. One afternoon I was amusing myself by shooting rats which had taken possession in vast numbers of an old outlying barn. Having put some meal down in the open, I waited a little distance away, armed with a B.S.A. air-rifle, and almost immediately veritable strings of rats, large

and small, came streaming forth from the nooks and crannies to feast on the meal. I had shot eight or nine of them, when suddenly every rat mysteriously melted away, and peering up to ascertain the cause, I beheld a small russet animal bounding nimbly down the wall-side towards the barn. It was a weasel, of course!

He saw me instantly, and darted into the wall; then, after the manner of his kind, he poked his head from a cranny much nearer and regarded me with his small black eyes. Immediately I raised the rifle he darted back, to appear, almost the same second, from another cranny several yards distant, and again to disappear. This he did probably a score of times, now only two yards distant, now away up the wall, then actually from under the eaves of the barn, passing from one point to the next with such speed that it was almost impossible to believe there was only one weasel present. One would have thought there were half-a-dozen of the little beasts stationed all up and down the crazy building, and popping out their heads in turn—such was his quickness in running through the interior of the masonry. It would have required a good snap-shot to kill him, even had I been bent on doing so; but it occurred to me that he was capable of playing more havoc among the rats in five minutes than I could have executed in a week, so I left him to it. Presently he lost interest in me, and judging from the stirring-up and the sounds of murder that then began to issue from inside the barn, I imagine the rats were well aware some one had called.*

* To-day, 24th March, I found the skeletons of a stoat and a rat lying about two yards apart on the moors in the Lyne valley. They had evidently perished in mortal combat.—H. M. B.

On other occasions, when carrying a shot-gun, I have wasted as many as three or four cartridges before ultimately bagging a weasel taking stock of me from an adjacent wall. His head would appear from a cranny, but the very instant I pressed the trigger he would draw back, the shot splatting all round the hole the merest fraction of a second too late. The report seemed not to disturb the animal in the least, for in a second he would be peering from another cranny, quite motionless, his black eyes full of inquiry. Generally he appears once too often, and a stray shot gets him, but it would seem that he is usually quick enough to draw back in time on perceiving the movement of the gunner's trigger-finger.

When out with a dog, I have had a stoat follow along the wall, appearing every few paces, and chattering abuse and defiance at the dog, sometimes only a yard or two away.

Many wild animals, among which the weasel family stand as typical examples, adopt the habit of moving in jerks so rapid as to deceive the eye, and of 'freezing' between each movement. In hunting, when it is necessary to escape observation, this is a very effective way of approaching game, and is made use of by the American Indians. In stalking deer I have sometimes desired to raise one hand, perhaps to remove a troublesome fly from my face, perhaps to adjust the breech of my rifle, and I have noticed that if the movement be made instantly it is very seldom observed, providing one remains perfectly still before and after, whereas a slow, cautious movement is almost certain to give the show away. The deer know this themselves, and on hearing a suspicious sound up goes every head in the twinkling of an eye;

then every deer remains stock-still till the cause of the disturbance is arrived at, when they bound away. Slow, cautious movements, then, are a mistake except at very close range, and it is to be observed that all animals that are most expert in hunting, or in evading those who hunt them, adopt this method of alternate 'freezing' and rapid movement.

HEARING.

The hearing of the weasel family is marvellously keen, and it is said that these animals can hear the scream of a mole, a sound so high pitched that the human ear cannot distinguish it.* Weasels are guided very considerably in their hunting by their hearing, and many a time in the dusk of evening one can observe one of these little freebooters sally forth, and, as though undecided which direction to take, sit bolt-upright and listen. At this hour of half-light, the sun having already dipped behind the hills, though a sea of crimson and gold still floods the west, a weasel is very difficult to recognise when seated thus, and having once removed one's eyes from him, it is almost impossible to locate him again. Motionless and straight as a picket-pin, he looks for all the world like one of the dead thistle-stems that surround him, and sometimes for several minutes he will remain thus, taking no notice should a motor vehicle or a farm-cart thunder by only a few paces distant. Then suddenly, having evidently heard sounds too faint for the human ear, he darts off

* I once caught alive a female mole which was in the act of feeding its young. As I held the animal by the skin of the back it opened its mouth, and though no sound was audible, the fact that it was 'screaming' was indicated by its quickly escaping breath and its general attitude of defence.—H. M. B.

in some chosen direction, plainly with some fixed goal in view.

This habit of evening listening is shared equally, or perhaps to even a greater extent, by the stoat, or it may be that the stoat is more conspicuous than the weasel, and therefore more often seen. In his winter garments, however, seated thus against a background of snow, it would require a very keen eye to locate a stoat at all, or, having located him, to keep the sight focussed upon him. While hunting, also, these animals pause to listen every few paces, evidently making greater use of their sense of hearing than their sense of smell.

It has often occurred to me that since the hearing of a weasel is tuned to catch sounds much too high for the human ear to hear at all, it is quite reasonable to suppose that the other extreme applies also—that is, that there are many deep sounds which, disturbing enough to us, escape a weasel's senses. Certain it is, as already stated, that a gun-shot does not disturb these creatures in the least, and the question arises as to whether so deep a report is within the range of their hearing.

THE MURDERER ABROAD.

Though the weasel's underground habits tend to reduce the destruction it does, for the reason that, progressing thus, the animal comes across sufficient rodents to keep it busy and prevent it devoting its destructive abilities in other directions, at the same time the weasel often uses these underground runways as a means of circumventing game which otherwise would be out of reach. One would not imagine the blind, subterranean mole to be in any way an enemy to game-birds,

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THE WEASEL HUNTING.

yet indirectly it is, because its underground passages, running out into the open, enable the weasel to surprise game which otherwise he would stand no chance of surprising, except by a very elaborate and cautious stalk. Locating game-birds out in the open, he makes the best of his way towards them through the mole-runs, peeping out now and then to correct the direction, till ultimately he darts to the surface in their very midst, seizing one of them ere the startled creatures have time to realise what manner of death has burst upon them. A strong cock-pheasant or a grouse will often succeed in rising in the air, taking the weasel with it, but generally the bird falls after a short flight, the weasel's teeth fast in its throat.

On one occasion I saw by the tracks in the snow that a grouse, thus surprised, had carried the weasel a matter of eighty paces, heading down into the glen, and evidently intent on making for the burn, as a hard-pressed bird often will. It had landed, however, two or three feet short of the water, on a sandy bar, and here a terrific struggle had taken place, the grouse making for the water, while the weasel was fighting to restrain it. Apparently the weasel had not had it all his own way, as the tufts of russet fur clinging to the snow indicated; but in the end he of course killed the grouse, and tried to drag it into a tiny cranny under a shelf. The body of the victim was much too large to be dragged in, and in his infuriated endeavours the weasel had actually dragged the bird's head off!

The ferocity of the weasel passes all belief. One day my brother and I were motoring slowly along a tortuous country-road, when on rounding a corner we saw two weasels, one in pursuit of the

other, tearing along the road towards us. Their tails and fur were bushed out, making them look double their real size, and we could hear the angry chattering sound they were both uttering. They saw the car immediately, and swerved; then the foremost one, in its eagerness to escape its pursuer, made straight for the car again, passing clean between the front-wheels. Without hesitation the other followed, while my brother and I hastily dismounted, clutched our sticks, and gave chase. For fully five minutes we hunted the two little demons up and down the roadside, several times being within an inch of killing one or the other; yet so preoccupied were they in hunting each other that they took very little notice of us, at times breaking cover, and, in the eagerness of their feud, taking appalling risks of having their spines broken by our sticks. I believe both stoats and weasels often hunt each other down in this way, following and fighting till one or the other is killed.

When a boy I caught a stoat in the very act of killing a rabbit, but the little brute saw me and made for the wall, not abandoning the rabbit until he was compelled. The rabbit being now quite dead, I tied one of its hind-legs to the roots of a Scotch thistle, then, with my stick ready, waited out of view. After four or five minutes the stoat reappeared, made a careful survey, then darted again upon the rabbit, shaking and worrying the poor dead creature like a miniature tiger. He next tried to drag it away, and, unable to do so, his fury was laughable to witness. Quietly I rose and darted towards the place. Seeing me, the stoat chattered and snarled, still dragging at the rabbit; but he delayed a moment too long, as I

had thought would be the case, and, much to my delight, paid the penalty with his life.

Though, like most very bold and ferocious animals, the weasel family is very low down in the scale of intelligence, the little renegades nevertheless resort to many clever and effective tricks when hunting. On approaching in the open game that cannot be reached in any other way, they will begin a series of the most wonderful feats of contortion—leaping into the air, chasing their tails, looping the loop a foot from the ground, and so on, till the creature they are after becomes consumed with curiosity, and, owing to the quickness of their movements, is unable to judge their exact distance. Pheasants and barn-door fowls become so overcome with curiosity on seeing a stoat or a weasel behaving thus that they actually stroll to meet him, as though mesmerised, while each evolution takes the little murderer nearer and nearer on his way. A final leap, a quick dash, and his object is reached—out goes another good pheasant or barn-door fowl!

The weasel is certainly of royal blood in the family to which he belongs, and the stoat, though so much larger, will not face him. The domestic cat is a fierce and formidable fighter, but I have seen an old poaching tom flee in furious panic from one end of a heap of sticks when a weasel entered the other.* A fox will similarly turn away from a weasel if he can conveniently do so; indeed, it seems that few animals can tolerate this musk-

* Since writing this, I have been informed by Mr F. J. Hutchison that in the garden of his house, on the outskirts of Edinburgh, he watched a stoat 'running' a domestic cat round the grass plot. Finally they closed, the stoat intent on business, the cat obviously in terror. Unfortunately, however, a noise from the house broke off the interesting conflict.—H. M. B.

bearing little fighter, and will give him a wide margin every time in preference to disputing the right-of-way. The weasel is quite impartial as to whom he attacks, having been known to kill calves, lambs, and even foals, the first named, it is said, by suffocating them.

MIGRATION.

Like all other members of his family, the weasel is of wandering habits, and the covert which yesterday contained no stoats or weasels may to-morrow be overrun by them. In the autumn their migratory instincts seem to be at their strongest, and at this season they are most commonly seen by roadfarers, darting across the open road and bounding down the hedgerows. These wanderings are quite unaccountable, as the animals do not migrate, for example, from the high, bleak hill-tops to the sheltered valleys, but remain evenly distributed. One merely takes over the hunting-range of another, a general shuffling and sorting-out taking place.

Stoats and weasels very often travel in families, eight or nine of them keeping together, working and hunting in unison like a pack of hounds. Sometimes in wild country family joins family, till an immense gathering of them is formed—travelling east or west, and leaving an area of devastation behind them. An army of weasels will turn aside for practically nothing, even the shepherd and his dog being unsafe should they encounter it. There are many cases on record of such an army having attacked men, and no more uncomfortable predicament could be imagined.

A Yorkshire shepherd with whom I was well acquainted was one day walking the moors, when

his dog gave chase to a stoat. The man readily lent a hand, when he was surprised to see more stoats, and still more, bounding towards him and his dog, giving tongue angrily like so many little panthers. The man stuck to his ground, and during the next few minutes he and his dog killed a large number of the little brutes. Finally, however, they were compelled to withdraw, the dog becoming tired ; and it is a fact that the animal retained so strong a 'weasel' smell that for two or three days after the encounter it was not permitted to enter the house, having to sleep out in the barn.

Scottish shepherds regularly recount similar engagements with these small creatures—both stoats and, less commonly, weasels—which, for their size, are the fiercest and most terrible fighting-machines in all wild nature.

POSSIBLE ENEMIES.

Though so fierce and formidable a fighter, the weasel does not always get it his own way with the creatures he sets out to destroy, and working a drain or a barn freely inhabited by house-rats is risky work for him. Rats have sufficient intelligence to combine against a common foe, and sometimes a veritable army of them will unite to drive a weasel from their habitat, handling him very roughly or even killing him. Generally, however, a weasel succeeds in getting away when thus set upon, probably leaving a train of dead, limping, and staggering rats behind him ; for, though he bites and holds on bulldog fashion when hunting to kill, he strikes like a rattlesnake to left and right when fighting in self-defence.

Nevertheless, an old buck-rat will sometimes

prove more than a match for a single weasel, and a very ample handful for the sturdiest of stoats.

A doe-rabbit with young to defend will turn and face a stoat or a weasel most gallantly, driving him out of her burrow, and stamping on him with her powerful hind-paws till all the fight is knocked out of him. Similarly, a mother-hare will attack one of these creatures with such fury that, unless he beats it for cover, he may find himself with a crippled spine.

Stoats and weasels attack and kill snakes with great dexterity, even the poisonous varieties often falling victims to their swiftness. Toads, frogs, beetles, and worms likewise figure conspicuously in the bill of fare of these animals; while any dead thing they find is welcome to their multifarious tastes.

HUNTING RABBITS.

When a weasel (the term is here used as applying also to the stoat) sets out on the trail of a rabbit, he sticks to that one rabbit, never wavering from his original selection till he has run it down. The quarry may run through half-a-dozen burrows thickly tenanted by other rabbits; it may cross and criss-cross its trail with a hundred other trails; but every trick it plays, every sidelong leap and double back, finds the remorseless little pursuer still on its trail. A young rabbit does not run far when hunted by stoat or weasel, but after one spasmodic sprint it seems to give up all hope, and become paralysed with terror. Immediately it catches sight of the weasel behind it, indeed, after one half-hearted endeavour to escape, it throws up the sponge, beginning to run in foolish circles, while without haste the weasel follows—by sight now.

Narrower and narrower become the circles, the rabbit begins to squeal, then finally it crouches helplessly and awaits its fate.

An old rabbit, however, will sometimes give a weasel a good run, keeping him occupied for an hour or more, and leading him far afield. A rabbit will even take to water when pursued in this way, and I have known one to swim a wide river, arriving at the other side in a much-exhausted state.

Weasels seem to be capable of exercising a hypnotic effect upon the creatures they pursue, and even when a rabbit has succeeded in getting away, and is on safe soil, it is often overcome by temporary paralysis. So helpless is it that a man can pick it up, as I myself have done on more than one occasion. I have seen a rabbit so paralysed after having fairly escaped that it was capable only of dragging itself along on its forepaws, its hind-quarters trailing helplessly, as though its spine were broken.

When two stoats or weasels are hunting together, they work as rapidly and systematically as a pair of well-trained dogs, one following the trail, while the other ranges to left or right. Should the trail turn in the direction of the one that is ranging wide, he picks it up, thus saving his companion a wide detour, and in this way they cut out many a circuit, so saving much time. So keen is their sense of smell, however, that they can scent the trail thirty or forty yards away should the wind be in their favour, and instead of following every twist and turn, as a dog does, they cut off the corners, travelling more or less straight, and re-joining the trail farther up. A weasel seldom actually treads the trail he is running, but follows

a yard or more on the leeward side, the distance depending upon the strength of the wind. This can be seen by any one who studies weasel signs in the snow.

It is a fact that sometimes a bitter feud will open up between a stoat and a fox, the stoat following the fox for great distances, probably with the idea in the first place of profiting by his hunting. It is part of the nature of the stoat to follow and follow on till he has killed the creature he is pursuing, and perhaps it is some such notion that causes him to follow a fox in this way, irritating and threatening poor Reynard till he is at his wits' end. A fox will seldom turn on a weasel of any kind if he can conveniently lope away, but to be followed and molested for hours on end is more than any self-respecting fox can be expected to endure. So, having left the stoat behind half-a-dozen times, he probably turns in the end and 'chops' it, and there is one little murderer less in the woods.

The weasels are the sworn enemies of every creature of the moors and the forests, rooks and crows mobbing them on sight, or hovering about with loud cries till the little assassins are driven to take cover. A friend of mine living in the Highlands kept for many years a tame buzzard, which used to hop about the garden, and during its career it succeeded in catching a large number of weasels, to which it was very partial. Certainly there is no accounting for tastes! I knew also of a large game cockerel, the property of a Lowland keeper, which not only killed rats and mice, swallowing the latter whole, but was reputed by its owner to have killed weasels and stoats. Its method was to pounce upon the creature, stamping and holding

it down with its large and powerful feet, then to deliver several sledge-hammer blows at the victim's head with its beak—secretary-bird fashion.

The best cure for stoats, however, is the steel trap, and the destruction of these hateful and bloodthirsty little animals, which are a terror to the woods they inhabit and certainly no ornament at the best of times, is a worthy pastime for the country boy with idle moments to spare, and an act which will be appreciated by game-warder and landowner.

HABITS IN SNOW.

In deep snow, when the Hunger Moon reigns, the weasels do not share in the general famine which then prevails over the land. Indeed, deep snow and frost suit them exactly, for they are as much at home in the snow as the otter is in water. Working beneath it, among the roots of the heather or under the thick entanglement of bracken and briar, it matters not to the stoat and the weasel how wildly the blizzard blows overhead, for these animals live now in an underground world, secure from gale and tempest, with the frozen snow as their roof and the crisp leaves as their bed. Sometimes the animal rises to the surface, breaking through the crust as an otter breaks the surface of the water; then, diving below the surface again, quick as a seal, he pursues his unseen way secure from his foes.

At this season of the year many of the mice have stopped up the entrances of their burrows to exclude the cold, and are sound asleep underground; but the keen scent of the weasel enables him to locate them and dive in upon them, the mice, torpid in their winter sleep, making never a kick in self-defence. The rats are gone from the banks

and the hedgerows to congregate in immense numbers about warm outhouses and in man's dwellings, so that a visit to these habitations is well worth the weasel's time. Birds, particularly partridges, form a habit at such seasons of huddling together in little groups, out in the open fields, and the hunter, locating them, has nothing to do but run under the snow till he is directly below; then, breaking surface suddenly in their midst, he is sure of a kill. In the same way he hunts larks out in the open, dragging them down from below, just as a fly is snatched from the surface of a pool by the trout lurking in the depths. Thus he is now independent of the mice-runs and the mole-runs in catching his quarry, and heavy is the toll he takes of field and game covert at such times.

It is only when there lies a thin tracking snow, and the ground is bone-hard with frost, that hunger is apt to fall upon the weasel population; and should such conditions last, they gather into packs, after the manner of wolves, and work the country systematically for game. But they are not the only sufferers at these times; in the hedgerows scores of small birds perish by hunger and cold. Daybreak finds them still seated among the branches, just as they were when the twilight shadows closed upon them; or, perhaps, hanging by one toe to the undergrowth, to fall with the first gust of wind into the kindly shadows which have so long befriended them. Stoats particularly hunt the hedges for such pathetic tokens of the Hunger Moon, and it is to be feared that not *only* the dead go to fill their hungry maws. At night-time they hunt the hedges silently for roosting birds, climbing high among the branches, and surprising the birds where they sit; for stoats,

though belonging to the earth, are nevertheless quite at home in the branches—more so than are weasels. Even the old cock-pheasant, the survivor of many a fiery blast of shot and powder, is by no means secure from them, though he may roost high up on the limb of some great oak, huddled close to the sheltering trunk, and screened from the vision of the human poacher who, armed with an air-rifle, searches for him from below.

Dead tree-trunks, thickly overgrown with ivy, afford excellent resorts for stoats during the Hunger Moon. All manner of birds, including wood-pigeons, seek the thick shelter of these trees in times of extreme cold; while the numerous little roots and stems of the ivy afford ample foothold and shelter for the hunting stoat. The remains of many kinds of birds are to be found among the dense cover of such trees, indicating that they have worse enemies than the harsh winter spells—death, swift and silent, falling upon them while they sleep.

In his eagerness the stoat will mount the barest of trees in pursuit of game. During keen spells the black-game in Scotland come down from the hills to feed upon the catkins of the alders in the valleys. I have seen an avenue of these trees crowded to their topmost branches with gray hens, and one day I watched a stoat foolishly trying to get at them, slick in view of the whole pack. He was about eighteen feet up from the ground, cautiously climbing towards an old gray hen, who was cunningly watching him with one eye. Every time the stoat drew near, the gray hen moved slowly out on to the thinner branches, till finally, with a cry of derision, she flew to the next tree. The stoat chattered abuse after her,

then began to descend, clutching and falling from one icy branch to another till within ten feet of the ground, when he dropped and made off—perhaps realising the utter futility of such a method of hunting. Weasels also climb during keen, cold snaps, though they are less given to this form of hunting than stoats. They feed at such times almost exclusively on mice.

TRAPPING.

Weasels and stoats are the easiest animals on earth to trap, as they make use of every drain that comes in their way, and, indeed, are not opposed to going out of their way in order to run down a drain of any kind. They do not fear the scent of steel, and will bound on to the spring-plate of the most obvious gin that clumsy fingers ever contrived. Keepers use dreadful traps very considerably for weasels. These consist of small square wooden tunnels placed through wall-bottoms so as to lead, perhaps, from the moorland to the covert boundary, or between any other favourite hunting-grounds of the weasel kind. In the centre of the tunnel is the trip mechanism which the weasel is sure to disturb in passing, whereupon a heavy log falls like a guillotine from above, shattering the life out of the little freebooter, as he himself has shattered the life out of so many. On one occasion a stoat was taken in a false floor-box trap set for rabbits, and during the night two rabbits and a big tom-cat fell into the pit to keep him company. The company must have been very lively while it lasted, for next morning the box was found to contain two dead rabbits, a dying tom-cat, and a much-mangled, though still lively, stoat.

If one can succeed in shooting one member of a family of these little killers, the extermination of the rest is merely a matter of patience, for weasels and stoats always come back for their dead. The best way, then, is to leave the shot weasel where it falls, and quietly take cover near by. In a few minutes one or two of the others will come back for the corpse, and they too should be shot and left without being touched, the gunner still remaining concealed till he has done his work. One need not be led away by any false sentiments to the effect that they come back for their dead prompted by a sense of family love for them, for the weasel loves no one, and is just as ready to murder his own mother as he would be to murder a family of blind and helpless kittens. He is a renegade and an outlaw, in whose character there is not one lovable feature, unless it be that he maintains a lifelong feud against a creature more loathsome and destructive than himself—the gray rat of our hedgerows and outhouses.

VALUE TO MAN.

Though a mortal enemy to the gamekeeper, the weasel is unquestionably a friend to the farmer. The desirability of reducing the rat population in every way possible is dealt with in the chapter treating of that animal, but here it may be stated that the weasels are one of nature's methods of keeping within reasonable limits the population of earth-burrowing rodents. Sometimes a stoat or a weasel takes up its abode among rat-infested granaries and outhouses, and the destruction it works among the rodents is enormous. To quote an actual example: A farmer in Yorkshire, whose outbuildings were overrun by rats, one day noticed

a most objectionable stench in one of the buildings where grain was stored. In the course of a few days the stench became so unbearable that part of the floor was removed to ascertain the cause, whereupon it was found that numbers of dead rats lay in the space directly under the floor-boards. Here and there the carcasses lay in heaps, as though they had been carried with some idea of storage, while many more had been dropped on the runways to and from these heaps. Examination revealed that a stoat or a weasel—or possibly a whole family of these dreadful little killers—was responsible for the slaughter, and for the remainder of that season very few rats were observed on or about the farm.

Reference has been made to the weasel's sense of hearing and its value as a guide in hunting activities. I was one evening strolling over some lowland meadows, on the off-chance of a shot at game of some sort, when the village boy who was with me drew my attention to a stoat sitting bolt-upright at a wall-foot in an attitude of listening. Anxious to observe its movements—for it had not seen us—I refrained from shooting the little pirate, and after a few seconds it began to bound off in a northerly direction, pausing now and then to sit up and listen, then bounding off in the same direction as though reassured. All its actions clearly indicated that it was going in the direction of some sound that had attracted it, and having travelled fully three hundred yards—probably considerably farther—it came at length to a small barn where numerous rats had lived all summer, and disappeared into the massive walls of the building.

This passing observation, of which little was

thought at the time, has since occurred to me as affording evidence of some importance. In the first place, it goes to prove the perfection of this animal's hearing. The stoat had undoubtedly heard those rats when first we caught sight of it, and it is rather remarkable that so minute an atom of sound could be heard so far above the general chorus of sounds of much greater volume. An animal's hearing and powers of concentration on one individual sound can evidently be screwed to a pitch far above our understanding; and I have noticed a blackbird successfully listening for worms in the earth, while not four yards away a lusty navvy was hammering a post into the earth and his mate used a shovel among loose gravel!

Again, the incident goes to show that the hearing of the weasel family is one of their chief guides in their hunting; and if every weasel passing within three hundred yards of a barn can tell at that distance whether the barn is rat-infested, there must indeed be few barns that escape their activities at some time during the season.

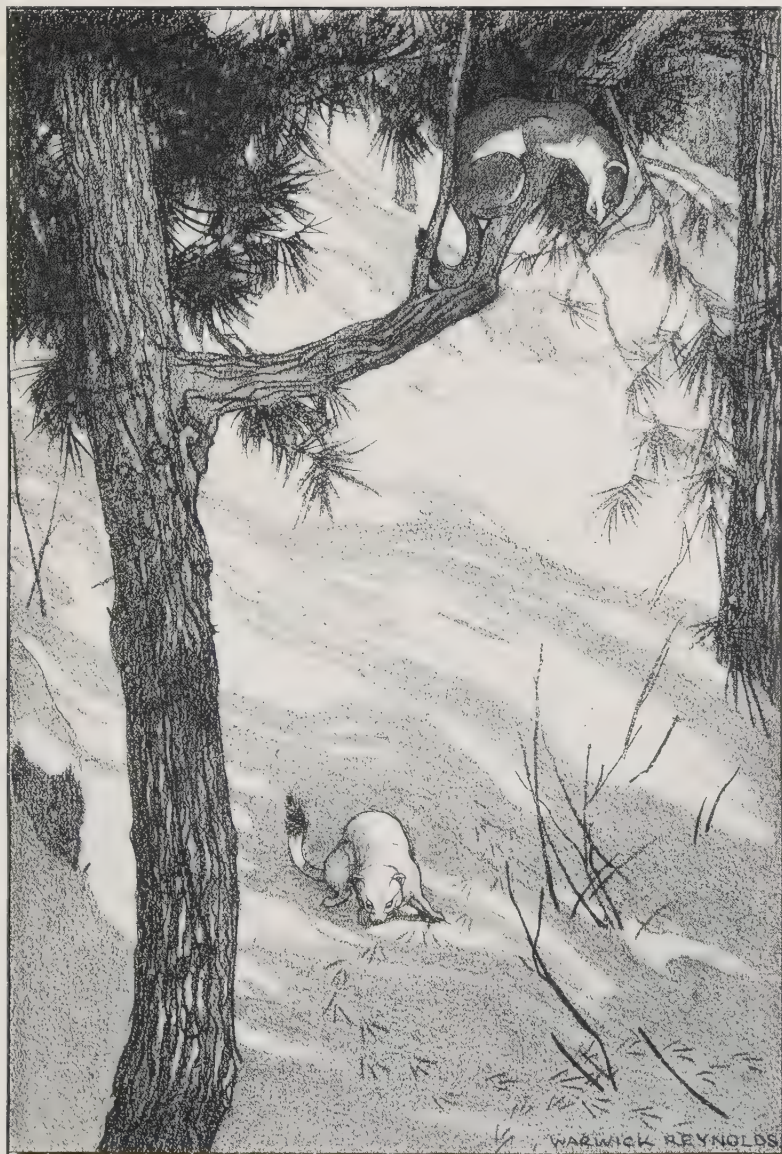
A weasel or a stoat that takes up its quarters amidst such buildings probably continues to scatter destruction in every direction till it becomes exhausted by its gruesome work, and this process is repeated after intervals of rest for so long as there are rats to hunt. Thus it is conceivable that in the course of two or three days a single weasel might annihilate and drive out the entire rat population of quite a flourishing rat stronghold—indeed, this regularly occurs; and were it not for the matter of polluting the atmosphere, it would be interesting to note the results that would follow the liberating of a small army of, say, semi-

domesticated stoats among the docks and warehouses of London or Liverpool!

STORAGE.

The habit of storing food is curiously developed in the land weasels—probably because they destroy so much more than they actually require for food that the natural impulse is to *cache* a certain proportion for a rainy day. But the rainy day seldom or never comes. I have known a weasel to drag five young larks into a cranny under a flat boulder of rock and leave them there, evidently with the idea of returning. Passing the place two or three weeks later, I found the larks still untouched. A weasel family living in a disused lead-mine had *caches* in every other nook and corner; indeed, anything killed and not for the moment required was tucked into the most convenient crevice and apparently forgotten. So far as could be judged, none of the stores was ever visited with a view to recovering its contents. The unquenchable thirst of the weasel is for hot blood, and though it will eat almost any filth it finds by way of a change of diet, I cannot imagine any weasel, save perhaps a maimed one, returning to a cold *cache* for its meal in preference to pursuing its lifelong march of destruction. In other words, it would be an exceedingly hungry weasel that turned to yesterday's store in preference to searching for fresh, hot blood; and since a weasel is never hard pressed for food except under the most unusual conditions, it is curious that it has developed the storage habit so strongly.

The more a weasel kills, the more it stores, and having spoilt its own hunting on a given range, dotted all up and down with bulging *caches*,



THE STOAT OR ERMINE—'WINTER'S KEEN EDGE.'

it moves to a new hunting-ground, and there repeats the appalling business.

WARRENS.

The home-burrow of a weasel, in which the young are probably born, is often very extensive—may, indeed, underlie several acres of forest, the weasel-tunnels tapping the mouse-tunnels in so many ways that it becomes impossible to tell where one set begins and the other ends. Where mice are abundant, the earth for acres may be a veritable network of creeps and runways just under the leaf-mould, so that the mouse fraternity can hold intercourse freely without venturing above ground. The individual communities live in the dead tree-roots, &c., each of which is a castle of habitation, while all are interconnected by underground corridors. The weasel takes over one of these castles, and is thus in touch with the whole mouse community of the forest; it could live for days without showing itself above ground. The mouse-creeps lead to and from the stream, and branch off from hedgerow to hedgerow, a veritable labyrinth throughout the wood; and the weasel, passing like a phantom of death along these corridors, slaying in every corner and leaving the slaughtered where they lie, is, moreover, able to surprise the pheasant scratching obviously among the leaves by darting from some screened opening in the ferns, or even by thrusting its way through the leaf-mould at the pheasant's very feet. To most wild creatures the earth is mother only—she screens their blind and helpless babyhood in her damp recesses, but thereafter the earth is regarded by them only as a place of sanctuary; but this little usurper of every creature's

domain uses such sanctuaries at its pleasure, and moulds each and every one to the murderous desires of its will. Barring the fox, the badger, and the otter, no creature of our fields and hedgerows is safe from a surprise attack by weasels. They are the most dreaded and the most destructive of all four-footed things, and were their numbers to multiply greatly it would be to the extermination of every bird in the trees and hedgerows, and every warm-blooded, fur-covered denizen of the earth.

NUMBERS.

But the weasel population does not multiply beyond certain limits prescribed by nature. If an area of country were left undisturbed for a number of years and no weasels or stoats were killed, they would not become unduly common—not so common, indeed, as they are to-day in certain well-stocked coverts where, owing to the abundance of food, every passing weasel is tempted to dally. At first thought this may seem strange, but if we have due regard to the weasel's life-habits, the reason is not obscure.

Finding conditions suitable, a weasel takes unto himself a certain hunting-range, and any other weasel trespassing on that range has either to fight or to fly. Being a weasel, he probably fights, and a weasel-fight is generally a fight to a finish. By the time the conquered one begins to realise he is getting the worse of it—if a weasel ever does realise such a thing—he is probably too badly knocked about to escape from his opponent, who, knowing he has the upper hand, goes all out to bring the combat to a conclusion. The more plentiful weasels are, the more commonly these meetings occur, and thus we have nature's prevention of

overstocking. Added to this is the huge mortality that occurs by family disagreement, a litter of seven or eight youngsters finally dwindling to about three ere they have finished running together. Again, the weasel is no respecter of sex, and a male weasel meeting a female is just as likely to kill her in endeavouring to realise his desires as he is to add to the number of his kind. These repulsive facts account for the limitation placed upon an entirely repulsive creature. The weasel is the weasel's worst foe; traps and guns contribute little in keeping down his numbers compared with the measures nature has brought to bear, and did not such measures exist, the weasel population would multiply till the extermination of other life alone brought their numbers to a halt.

BREEDING OF THE WEASEL.

The weasel makes a nest of leaves and moss, locating it among the roots of a fallen tree, in the bank of a hedgerow, in the foundations of a dry rubble wall, or in a rabbit-burrow. Gestation occupies just under six weeks, and the young are blind for nine days after birth. They are totally dependent on their mother for four weeks; at six weeks they are well able to fend for themselves. The female weasel is a devoted mother, and has been known to return in the face of gun-fire, at the cost of her life, as it proved, to pick up one of her young too badly injured to follow her to safety.*

Naturalists disagree as to how many litters are produced per season. Some state emphatically not more than two; others infer that four litters

* Personal observation.—H. M. B.

per year are not uncommon. My own observations in the north of England and in Scotland, where the weasels feed plenteously on the titlarks that swarm in the bent and the ling, go to prove that at least three litters, and commonly four, are the regular order. I have seen young weasels from May till late September.

Mating begins in the middle of February, while there is still snow on the hills. The first brood is born at the end of March. Now be it noted that the young are dependent on their mother for just as long a period as gestation takes. Since she runs with her mate throughout the season, it is probable that she conceives her second litter within a day or two of her first litter being born. This would mean that the second family would appear about the middle of May, the third at the end of June, and a possible fourth in the middle of August. Even then, if four litters were produced, the latest kits would be self-supporting by the end of September, which coincides with my own observations.

By this reckoning we are not allowing any wastage of time, and there is no special reason why we should. A weasel has been known to be nursing her new brood ere the previous brood was properly self-supporting, and there is no doubt that when food is sufficiently abundant this process is repeated throughout the spring and summer.

The nest, if not deserted, is rebuilt for each new litter, and the half-grown young have been known to take shelter in a nest containing their newly born brothers and sisters.

SIZE.

The length of an adult male weasel is usually about 8 inches from the tip of the nose to the root

of the tail. The tail seldom exceeds $2\frac{1}{2}$ inches. The female is about 1 inch shorter.

PECULIARITIES OF THE STOAT—BREEDING.

Curious though it may seem, there is no evidence to suggest that the stoat produces more than one litter per season. The young are born in April, and they take little, if any, longer to mature than do weasels. I have watched the growth of the young in Galloway, in the south-west of Scotland, but by August I have never seen any but fully grown stoats. The mated couples appear more faithful to one another than are weasels.

SIZE OF THE STOAT.

A full-grown male stoat will measure 11 inches from the tip of the nose to the root of the tail; tail, about $6\frac{1}{2}$ inches. The female seldom exceeds 9 inches; tail, about 5 inches.

DISPOSITION AND COLOUR-CHANGE.

The stoat is described by gamekeepers as a more playful creature than the weasel, which means that it is more commonly seen bounding along hedgerows and hunting generally in the open rather than about burrows. As already stated, the stoat is easily distinguished by the conspicuous black tip that adorns its tail, this feature being absent in the weasel. During the periodic stoat plagues that fall upon most of our woods, the animals can be seen at almost any hour of the day or night pursuing rabbits, &c., whereas, if a similar plague of weasels exists, they are much less conspicuous.

In winter the stoat sheds its russet coat and assumes one in keeping with the snowy landscape.

The change is not always perfect, but grades with the altitude. In the south of England the stoats often remain brown throughout the winter. In the Midlands the brown shades into gray, sometimes only a streak of brown remaining along the animal's back and about the legs and the paws, its flanks being gray. In the north of England and in Scotland the stoat of summer becomes the ermine of winter, the animal being quite white except for the black tip to its tail, which remains under any conditions—hence the black-flaked ‘ermine of kings.’ Generally the furs are delicately tinted with yellow, which, though seemingly a beautifying feature, nevertheless detracts from their market value.

Ireland has a stoat of its own, smaller than the British variety, though identical in habits, &c. The common weasel (*Putorius nivalis*) is unknown in Ireland.

THE OTTER.

PROBABLY quite a small percentage of readers have seen a wild otter in a free state, and one is unable to form a just opinion of this beast from the pitiful stuffed specimens one sees in taxidermists' windows. In truth, the otter is among the most graceful and beautiful of living things, a perfect sample of animal activity; but its perfection is in its very life, its beauty in its ever-changing poses, each pose full of grace and ease.

One day, when fishing a Highland loch, I found my way barred by a tumultuous burn tumbling down from the heights. In order to cross it I was compelled to climb up the mountain-side to a much higher point, on reaching which I chanced to look down to the spot at which the burn joined the loch.

The scene was one of exquisite beauty, the burn emptying into a cauldron at the loch-margin, the mosses and ferns of which stood out in wonderful tints in the evening sunshine. One could smell the fresh, scented spray as it floated upwards; mountain-ash and silver-birch shadowed the pool, and the whole little scene lay below, a veritable fairyland of loveliness.

All at once a shadow appeared in the centre of the cauldron, and began to slide swiftly among the moss-covered stones till it reached one larger than the rest, which it mounted. It was an otter! There she rested, glancing to left and right; then suddenly she uttered a hoarse, penetrating note, exactly like the call-note of a moorhen.

In a few seconds the first otter was joined by a second supple, boneless creature, evidently her

mate, and the two began grooming themselves, quick and changing in their attitudes as the light effects upon the water. They might have been striking poses for a camera the whole of the time, yet neither of them remained still in any one position long enough for one to make a $\frac{1}{20}$ th second exposure of them. Presently, as though prompted by a simultaneous impulse, they slid back into the water, making scarcely a ripple, and evidently they had caught my scent, for they did not reappear.

Before then and since I have watched otters many times on the Esk, the Eden, the Wharfe, and on one or two Scottish burns and rivers, and have always been struck by their beauty and their extraordinary vivacity, returning home after such a glimpse with the feeling of having seen something worth while. To watch otters fishing the pools of some wide, shallow river about sunset is a sight worth seeing, as by the ripples above one can then follow their movements as they glide hither and thither below the surface. The speed at which an otter can travel under water is most astounding, twisting and turning this way and that, and resembling nothing more closely than a huge conger-eel, as it threads its way in and out among the boulders, or flashes torpedo-like across the shelves. One curious thing about the otter is that, however rapidly it moves in the water, it is always deadly silent, never lashing the surface into foam or creating so much as a bubble by its movements. The creature leaves the water or slides instantaneously into it, making only the faintest ripple, and it is difficult to believe that an animal so much at home there is not really a water animal, but has taken to that element simply for convenience.

At one time the otter was a fierce and terrible land hunter, like the stoat and the weasel, and it is probable that he took to hunting the waterways simply because he found food most abundant there. Voles had their creeps to and from the margin, wild-fowl were in the rushes, and rabbits swarmed within the sandy banks. These were the otter's natural prey, and so he took to hunting by the water's edge, where such food was most plentiful; but he came upon bad times, when the river was frozen and there were no wild-fowl, when voles and rabbits were scarce owing to the floods of the previous spring, and when only the rapidly flowing burns were free of ice. At that season of the year the trout lay within these tiny burns, weak with spawning, and gigantic salmon rolled upon the gravel redds. The hungry otters found the fish easy to catch, affording food in abundance during the Hunger Moon, and so the otter became more and more of an angler and less and less of a land hunter. By degrees he grew into a master in the art of swimming, easily outmanœuvring the lightning-darting trout and the kingly salmon, and earning his living in this way very much more easily than he ever earned it on land.

To-day the otter is regarded by most people solely as a water animal; yet young otters dislike the water, and are only made to take to it by their parents, who, diligently and patiently, teach them the art of swimming.

NIGHT HABITS.

At what time the otters take their rest no man can say, for when undisturbed they are never still day or night. In thickly peopled areas, where

they are apt to be disturbed during the day-time, they seldom show themselves before dusk, moving about under cover of the rushes while daylight lasts; but in many a lonely Highland loch they are to be seen active the day through, and to be heard during the night.

When fishing at night-time on the Wharfe, I have had otters come within reach of my rod, swimming round in circles as though unable to make me out, and uttering many strange noises in their conversation together. One of these noises is a shrill whistle, exactly like a human whistle, and doubtless produced by quick exhalation through the nostrils. The most common note is the 'moorhen call,' already referred to; then they have a series of friendly, rapid 'cluckings,' used much when playing together. They break surface clucking, so evidently they cluck when under water. It is rather an uncanny experience to have these beasts so closely investigating when one is fishing alone by a lonely part of the river—the quietude, the moonlight on the water, the gliding shadows across the pools all adding to the general eeriness of things; and I remember once my companion, who chanced to be a city man, found the otters altogether too much for him. He stuck it for some time, then came over to where I was fishing and confessed that the brutes frightened him; nor could I ever again induce him to remain at the river-side after sunset, albeit the finest trout rose most freely at night.

When about twelve years of age, I myself was badly frightened by an otter. It was sunset, and I was fishing at a point where a large burn joined the river. Here the water flowed very rapidly among the boulders, and every trout-fisher knows

how deceptive the moving shadows are under such conditions—how, to the imaginative mind, they are apt to take on the semblance of great, moving, octopus shapes floundering below the surface.

I was just in the act of landing a fine trout, when one of these phantom shadows suddenly separated from the rest, and began to wind a rapid, sinuous course towards me. All that I saw was a large black animal, having a snake-like body of apparently unlimited length, gliding, sliding, making its way through the riffles, while in the dim light it assumed unheard-of and terrifying dimensions.

Of course it was an otter, but I did not wait to investigate further. Without delay I dropped my tackle and fled back to the farm, soliciting the company of a friendly farm-hand, who accompanied me back to recover the rod, not forgetting to subject me to a goodly amount of chaff then and thereafter. I have no doubt to this day that the otter was in pursuit of the trout I was actually landing, which had attracted its notice by fighting on the surface.

ON THE SALMON REDD.

A very old and hardened angler with whom I am acquainted was one night badly frightened by an otter. This man was, and is still, the most notorious salmon-poacher on the Tweed—which is saying a good deal! He lives by his rod winter and summer, and, like so many Border men, cherishes a deadly feud against the water-bailiffs, who are set to protect the salmon against illegal capture. The law enforces certain regulations; the poachers say that the salmon come from the sea, and therefore belong to no one—which is every one—that they are the property of the man who catches

them. Be that as it may, the poaching of salmon amounts almost to a religious duty with my old acquaintance, and on the night in question he was resorting to a most illegal device—namely, ‘burning the water.’ This consists in throwing a light on to the surface of the water; then, as the fish hoves in view, attracted perhaps, like a moth, by the light, the poacher strikes a large gaff into its body, and hauls the kingly monster ashore.

But Ronald knew where the salmon were, and the light was good enough for him to dispense with any illumination. Approaching the shallow spawning ‘redd,’ his keen eyes located a veritable leviathan, and wading in behind it, Ronald began to stalk slowly upstream, his eyes on the salmon, his folding cleek in his hand. He was within a yard or so of his target, and in the very act of striking, when a movement at his feet arrested him, and looking down, he saw two green eyes, flaming with hunting lust, peering up into his! Also he saw a very vicious face and a dark outline almost touching him, for the otter was in the act of stalking the same salmon, and, like Ronald, was so much absorbed in the stalk that it had never noticed the rival angler!

With a yell Ronald fled for the bank, crying out that the ‘devil was in the water;’ while in the opposite direction, as much scared as he, fled the otter.

One evening, when I was fishing on the Tweed, an otter reared itself high out of the water within two yards of me, its head and shoulders appearing well above the surface; then, having taken a long and fearless look, it slowly sank, and reappeared about thirty yards away, only its head up this time, to look again. This it did time after time, working

its way up the river, and revealing itself each time at a greater distance, till fully a quarter of a mile away I lost sight of it.

FEROCITY.

It is fairly certain that the stories one hears from time to time about otters following human beings, apparently intent on attack, are the result of this animal's uncontrollable curiosity. I do not believe that one otter in a hundred actually knows what man is; they know his scent, and fear it, taking to deep water or to cover immediately that scent assails their nostrils; but man in the flesh is an unknown quantity to them. I have myself, as related, known otters to come close up in order to investigate. Had I moved away, they would probably have followed, not having caught my scent, and it would have been an easy matter to send a letter to the local press relating how an otter, intent on mischief, had pursued me!

The most surprising facts concerning an otter's ferocity came to my hearing in Yorkshire, and when sifted proved to be genuine. A church-sexton was one night fishing for eels near Ripon, accompanied by his wife, when an otter was observed to slide out of the water a few yards away and come straight towards them, sneaking through the long grass on its belly, much like an eel crossing a meadow. The man at once rose, shouting and clapping his hands; but, hardly pausing, the animal came on, refusing to turn aside even when something was thrown at it. The two people then withdrew, but the otter still followed, till eventually the man tried to drive it off by striking it with his wife's umbrella. The umbrella was broken over the animal's back, but

the otter did not desist till the two gained a foot-bridge, which they crossed, the otter seeming for a time still inclined to pursue.

This must have been the case of a female whose young were very near at hand; but the story merely goes to support my belief that the majority of otters do not recognise man when they see him, and would be as likely to attempt to drive him from the vicinity of their young as they would be to attempt to drive away any other trespasser. If such acts of aggression on the part of otters were out of sheer ferocity, it is curious that they never attempt to attack sheep, &c., which they would be much more likely to drag down and kill than they would be to drag down a man.

A gentleman with whom I am acquainted was recently snipe-shooting in early autumn on a moor near to Pateley Bridge, when, on reaching a small tarn in the corner of an extensive bent-allotment, he sent his spaniel into the water to flush any birds that might be in the rushes. The dog, having done its work, proceeded to swim about, grabbing at the floating weed, and amusing itself as a hot and thirsty dog will under such conditions. Suddenly it appeared to be in great difficulties, thrashing the water with its forepaws and yelping, but, in spite of its frantic endeavours, making no progress towards the bank. The bed of the peat-pool was too treacherous for the owner of the dog to attempt to wade in to the rescue, and he concluded that the animal must have become entangled in some submerged barbed wire or weed—probably the former, as it seemed to be in great pain. Shifting his standpoint, however, the gunner was astounded to see that a large otter had hold of the dog by the shoulder, evidently intent on drowning the poor

animal by dragging it under. Both animals were more or less mixed up ; but taking a risky shot, my friend managed to effect the dog's rescue, the otter relaxing its grip and disappearing.

The dog was very badly injured, and had to be carried by its master two miles or more to the nearest farm, where a conveyance was obtained. I myself saw the wound the otter had inflicted, and have no doubt whatever that had there been no human help at hand the spaniel could never have succeeded in gaining the bank of the tarn.

A fact worth relating is that whenever that dog again passed near the tarn it would hunt through the rushes with savage enthusiasm, and it became really keen on hunting otters, though, fortunately for its safety, it never again found itself engaged in a single-handed combat with a 'water-weasel.'

The bite of the otter is truly dreadful, and, except by a stroke of good luck, no dog could succeed singly in killing one of these beasts in its natural environment.

MIGRATION.

Like most of the members of the weasel family, the otter is of nomadic habits. A female with young, of course, does not go far while her kits are little, and similarly a pair of otters, travelling together, may be tempted to stay for a while in or about any stretch of water which affords fishing of the kind that suits their tastes ; but, generally speaking, this animal recognises neither border nor range. Its whole life consists of one gigantic migration, which only old age terminates. Beginning, perhaps, at the sea, it works up the estuary of some chosen river, passing huge cities by the way, where railways thunder

over the steel-girder bridges, and the lights of 'garret and basement' quiver far out on the oily flood. How many tired-eyed Londoners whose windows overlook the great Thames realise that while they sleep this creature, the otter, usually associated only with the rugged grandeur of Highland burns or the silent, dew-spangled meadows of the far-away, passes them almost nightly on its way to a happier hunting-ground? Yet all the otters of the upper Thames—and there are many—have probably passed through the lights of London at one time or another on their lifelong wanderings. Away up the river they go, dallying only here and there, till that which was once a mighty tidal water, bearing the trading-vessels of many nations upon its bosom, becomes a tiny trickling brook, too shallow now to afford fishing and shelter for the wanderer. The otter then leaves the water at a chosen place, and makes the best of its way over the watershed to the source of some neighbouring river, which it follows to the sea.

SYSTEMATIC HABITS.

The otters have recognised runways by which they pass from the head-waters of one river they frequent over to the head-waters of the next, and—just as it is said that if a bear crosses a certain creek at a certain place, any bear following, even ten years later, will cross at exactly the same place—so the otters tread in each other's footsteps generation after generation. Thus, if an otter leaves the stream at a certain tree and begins to make its way overland, it may be taken that every succeeding otter will leave the water at the same tree and make use of the same runway. In Canada the professional trappers know the otter



THE OTTER—'LEAN DAYS.'

runways across the watersheds, and such knowledge is carefully guarded, to be handed from father to son or grandson, or whoever may succeed to the trapping-range; for an otter runway is a source of unlimited supply, capable of yielding a definite number of pelts each year.

The same applies to the otter landing-places. They have certain recognised landing-stations, probably flat boulders or shelving plateaux of sand, which they frequent while fishing, making use of no other. Having located one of these landing-places, one can easily keep count of the otters that pass, and if it be a sand-bank, it is worth while washing out old prints in order to keep trace of the new. A flat boulder of rock at the head of a pool at a point at which the river narrows and becomes too rapid for the animals to negotiate is often chosen, and here the remains of large trout that the otters have taken out of the water are often to be found. I remember one such landing-place on the river Wharfe which told many a woeful story to passing anglers, and which, incidentally, did the otters no great good in that locality.

UNDERGROUND HABITS.

Lead-mining was once a flourishing industry among the hills of the West Riding, and many great mines existed in the heart of the lonely moorland districts. The discovery of surface-lead in Italy was, I believe, the chief factor that caused their abandonment, and the great majority were shut down within a year. Veritable hives of industry some of these workings were, situated in desolate and wind-swept regions; now for forty years or more they have been left to crumble into waste.

visited only by an occasional shepherd, and answering no more useful purpose than to shelter the horned mountain-sheep from the upland gales, and to afford roosting-places for countless thousands of starlings. The birds arrive in flocks about dusk, filling the air with their strange call-notes and chatterings, and alighting among the ruins till every turret and pinnacle is black with them.

There is a spirit of romance about these long-abandoned sites, for each has its strange history known only to the oldest village-folk. Many of them had their own reservoirs, designed to feed underground canals by which the ore was carried out deep in the valleys, and to supply water for the great washing-floors, which are still intact. In the Bolton Abbey vicinity the bursting of one of these dams one rainy night led to the inundation of an entire mine, and to-day a few masses of water-washed masonry lying in a quiet glen are all that remain of a tragedy about which the outer world never heard—men, women, and children being drowned in their sleep by the sudden assault of a mighty wall of water. In other localities feuds of considerable bitterness arose between the imported miners and the dalesmen, free fights occurring everywhere; and in one instance, in order to avenge an imagined grievance, the miners stealthily raided a village by night and stole the May-pole!

But though tradition lives on, the mines are fast fading into the blue level of the landscapes, and only the vast underground workings remain intact. In many cases the mine-workings tap natural corridors running for miles under the moors, a labyrinth of underground rivers and waterways, which in turn tap the ravines and cañons, thus laying open for the convenience of

the otters an underworld of dripping corridors by which they can travel, unseen, far into the heart of the moors.

To what extent do the otters use these subterranean passages, the innermost secrets of which are denied to all but themselves? This is a question I have tried hard to solve, and the evidence gathered may be of interest. Otters have been known to rear their young among the ruins of the lead-mines close upon two miles, through the deepest heather, from the nearest trout-bearing waters, and in the midst of regions where food of the kind they require must indeed have been scarce and hard to get. Did the parent otters come and go by the mine-workings? If so, the whole vast underworld of corridors must have been at their disposal. Some of the underground rivers contain white, wall-eyed trout, like the subterranean rivers of Colorado—the offspring of imprisoned burn trout, no doubt, which, by long confinement, have become a well-defined underground species. The most interesting item of evidence I have is that a shepherd, whose word could generally be relied upon in such matters, told me that he was much mystified at the discovery of one of these fish lying on a slab of masonry among the mine ruins fully a mile from the nearest water. The fish was partly eaten, and the work undoubtedly looked like that of an otter. If so, the fact proves that the darkness of those profound workings is no handicap to this creature in its hunting; and that being so, it is reasonable to suppose that the otters breeding among the mines obtain some, at any rate, of their food from the subterranean streams and rivers.

There is no doubt that an otter losing its way among these corridors might live for months, even

years, without seeing the daylight, for frogs and lizards are plentiful here in addition to occasional fish. It is further possible that, finding such habitat to their liking, the otters frequenting these workings might, generation by generation, become more and more underground in their habits, and less and less dependent on the open streams—finally becoming a distinct species, like the white, wall-eyed trout, or like the cave-snakes about which we have read so much.

I have never heard of anything approaching a species of underground otter, but such things may exist—if not in this country, where it is only recently that the workings of man have rendered such a thing likely, at any rate in countries where the conditions are more favourable, and where man's knowledge of nature's doings is at the best superficial.

SEA-OTTERS.

The 'sea-otter' is often spoken of as a larger beast than, and a different species from, the river-otter, but to the best of my knowledge this is not so. There is only one sea-otter, surviving to-day on the Asiatic and American shores of the Pacific coast. It is a highly specialised animal, bearing a strong resemblance to the seal. In this country there is only one species of otter—*Lutra vulgaris*. The commonly-spoken-of sea-otter is not a sea-otter at all; nor does that animal come within the scope of this book. It is merely that an old and heavy otter steers clear of the shallow waters of the river-heads, limiting its hunting to the river estuaries and the sea itself. Otter-hunters record that the largest otters are always taken near the sea, and on the rugged coasts of Scotland and the west of

Ireland many otters have the sea-caves as their habitat, these beasts often being of immense size, and capable of uttering many weird noises of their own. They are merely old river-otters, which, having outlived the restlessness of their youth with its many perils, have taken to a more leisurely life amidst their ocean fastnesses. 'Land-otters,' passing visitors, no doubt, occupy the same caves, and many otters born by the sea seldom or never leave it, and, thanks to an abundance of food, grow to a great size. This, to my mind, explains the theory of the big sea-otter. He is either an old otter who has taken up permanent residence in the sea-caves, or an otter that has grown to a great size owing to abundant sea-food; and all spring from the same stock.

Much sport can be had hunting these sea-otters with dogs and shooting them with rifles as they emerge from the caves, their skins being valuable, while they are certainly of no value to man in such secure retreats, where they are never seen, and do nothing to pay for the amount of fish they destroy. It is best to obtain a good seaworthy boat, and not to land, leaving the dogs to work the shore while one waits with the rifles just beyond the surf. A calm day and low tide are necessary; otherwise there is a great danger of striking a submerged boulder, and a greater difficulty in shooting. If the otters once see the men they will not bolt from the caves, remaining and fighting off the dogs; but they are far more ready to bolt from a white dog than from one that is dark in colour. Incidentally one gets any amount of other shooting thrown in; and if a rifle is used for the otters, a shot-gun also should be carried, as often whole flocks of rock-doves emerge from the

caves, in which they breed, while seafaring wild-duck of different species are not uncommonly met with. The sport, combined with the grandeur of the scenery, the wholesome air and exercise, and the element of risk, makes a day of this kind thoroughly worth while. While enjoying a day's otter-hunting by the river as much as any one, I must say that my sympathies are too much with the otter on such occasions, and the nature of the sport too cut-and-dried for it to compare for real pleasure with the Bohemian element of an impromptu shore hunt. (See *Wild Sports and Natural History of the Highlands*, by Charles St John.)

HABITS ON LAND.

To deal further with the otter's recognised migrating routes, the following account, apart from numerous passing observations, goes in support of what has been said. During one extraordinarily severe cold snap, when even the most rapidly flowing mountain-brooks were festooned and in places partially blocked by fantastic ice-formations, a moorland boy located the tracks of an otter following the course of a small mountain-brook in the very wildest of regions at an altitude of 2000 feet or more above sea-level. The brook emptied into a spacious tarn or loch, which, again, was drained by a small tributary of the Wharfe. The otter had evidently come, then, from the Wharfe, followed the tributary to the tarn, and, fishing there for a time, was now making his way up the brook still farther into the heart of this No-Man's-Land.

There was a good tracking snow on the ground, and it was interesting to note the animal's manœuvres. The brook was all but ice-bound, every

pool being frozen over except at the point where the water, with the metallic ring of extreme cold, tumbled into it. Accordingly the otter was compelled to travel along the bank, but every now and then he had dived into a pool, and invariably returned with a fish. If there was no fish in the pool—or ‘dub,’ as it would more expressively be termed in that locality—then he had passed it by with only a casual glance, and many of the most promising pools he had treated in this way, taking his fish from the least likely and least noticeable places of harbourage. Evidently the animal was able to tell in some mysterious manner whether or not the tiny bay contained a lurking trout—and this with the water covered with ice, upon which rested a layer of snow, rendering it entirely opaque. One can only judge that an angler’s ‘sixth sense’ guided him in his hunting—not an unlikely state of affairs considering to what extent man himself, who is but a casual visitor to the water at the best (or worst) of times, and in no way dependent upon it for his next meal, cultivates an instinctive knowledge as to the whereabouts of fish. Probably if we thought less deeply and followed our instinctive promptings without question, as the otter does, we should be more successful in our angling.

For well over two miles the otter had followed the burn, which then became so precipitous and narrow as to bar the ascent of fish, and here the animal had set out across the heather in the direction of the Nidd valley, evidently being intent on striking some tributary of that river. The tracks appeared very fresh, so out of curiosity the boy still followed. What was his surprise when, capping the next ridge, he came right upon the otter descending to the next burn !

Seeing the intruder, the animal turned, and for fully ten seconds stared hard, as though on the point of showing fight; then he set off at his best speed down the icy incline. Naturally the boy pursued, keeping close up to him, and could have killed him with his stick had he been so disposed. The otter's manner of progress was very peculiar, for, bounding awkwardly a few paces, he would suddenly fling himself on his chest and belly, his forepaws tucked limply under him, and giving himself the necessary impulse with his hind-legs, would slide quite a considerable distance, not troubling to get up till he had actually come to a standstill. Though the ground was in good condition for tobogganing, he made but poor progress, and seemed too much dismayed to be capable even of selecting the favourable down-grades; in fact, one is inclined to think the poor animal was dazzled by the whiteness of the snow, as the sun was shining brilliantly. Finally, however, he reached deep heather, and diving through the frozen crust as he would have dived into water, he disappeared from view, making his way out of the danger-zone among the roots of the heather.

When the boy recounted his curious experience that night by the kitchen-fire of the shepherd of that locality, the man was much interested, saying that he himself when quite a boy, over forty years previously, had tracked an otter one winter up the same burn, and that it had left the burn to make its way across the watershed at the very point the boy described!

WINTER HABITS.

During long spells of frost otters are very apt to become out of condition, but this applies only

to those inhabiting streams in which they are solely dependent on trout for food. During extreme cold snaps the healthy trout become torpid, and lie hidden under the rocks at the river-bed except when a gleam of sunshine calls them forth, the only fish remaining within the otter's reach being badly conditioned spawning fish, which afford very little nourishment. At such times an otter will become entirely diurnal in its habits, fishing during the hours of the day when the light is at its best, and when, presumably, it is attracted forth by the healthy fish astir at that time only. On one such occasion the river was frozen save for a narrow channel down its centre, and the otter could be seen swimming back and forth between this channel and the ice-covered stretches. Sometimes it would come quite close to the village, swimming and diving this way and that while groups of interested villagers watched from the highway above.

Hard pressed by hunger during a cold snap, an otter has been known to venture far from its beloved element in search of food. These animals have even been found guilty of plundering hen-roosts and invading rabbit-warrens. I believe also that during such times they kill a fair number of water-fowl, either by swimming beneath them and dragging them under, or by surprising them in cover. The otter referred to above formed the habit, during the long cold snap, of hunting in the wood that bordered the stretch of river it chiefly frequented. In the centre of this wood, about half a mile from the river, was a small, round pond, amply screened by undergrowth, and here a water-vole had taken up its winter home—seeking, no doubt, security from the floods, while possibly

the presence of the otter in the river below had no little to do with the isolation of the vole's chosen sanctuary. Anyway, there it was, in a snug little burrow having its exit below the ice-line of the pool, and its entrance under a dense entanglement of briar and dead bracken in the bank above.

But alas for the most carefully laid plans of mice and men! True that it lived in immunity from the flood, which never came, anyway; but one day, in visiting the pool, I found that the otter had been there too. It had laid waste the bank burrow, and evidently hunted the pool for the vole, which had escaped by the back-way, but whether or not its efforts had been crowned with success I could not ascertain.

On the other hand, I have known water-voles to live and have their families during the summer months in parts of the river much frequented by otters, and I doubt very much whether in the ordinary way the attitude between otters and voles is otherwise than one of alert neutrality.

To turn to a cognate topic for a moment: it is a curious fact that in Canada the otters and the beavers live on the most friendly terms; in fact, the otter is known to go out of its way in order to share the habitat of the beaver. Where there are beavers, trappers are fairly sure of finding an otter or two; and where there are no beavers, the recognised way of drawing otters to the locality of the traps is by the use of beaver castor. The castor is generally placed on a stick just above the trap, which is set near to one of the recognised otter landings or slides.

In countries where the winters are consistently severe, the otters do not appear to fare badly.

Adapting themselves to circumstances, they live under the ice along the margins of the great lakes, perhaps not appearing above the surface for days on end. After the freeze-up the lakes usually sink a little, owing to the sealing of the creeks, with the result that along the shores and surrounding the boulders shallow air-spaces are formed, to which the otters resort to rest and breathe. Sometimes, where the ice is clear of snow, the otters in Canada are killed by the Indians, who follow them about hither and thither till they become exhausted. They are then left to drown, and the ice is ultimately broken; or, alternatively, a steel spear is carried in a hollow tube, and when a favourable opportunity occurs the tube is flung downwards, and the spear, thus ejected, penetrates the ice and impales the body of the unfortunate creature just beneath. This is a method largely employed by the Canadian Indians in hunting musquash.

A WILD OTTER IN CAPTIVITY.

When a boy of about fourteen, I one day watched an otter enter a drain which, I knew, terminated in the centre of a meadow. My first act was securely to stop up both ends of the drain, then run for the gamekeeper, who, like myself, had a perfect mania for catching things alive. Having heard my story, he produced a chicken-coop which had the usual type of sliding door, and this we fixed at one end of the drain, building it up so that we could push down the door should the otter prove sufficiently obliging to bolt into the coop.

When all was ready, a small Welsh terrier, whose real business was in the badger line, was

insinuated at the other end of the drain, while we stood in expectancy by the coop. Sure enough, scarcely two minutes had passed when something entered the box, whereupon the door was jammed home, and—we had our otter!

Just what we meant eventually to do with him I cannot recall, but our first act was to convey him to the keeper's wash-house, where, having stopped up the drain in the centre of the floor, we climbed to the sink, and from this place of security cautiously opened the lid. The poor captive lay flat on the bottom of the coop, refusing to blink an eyelid, when the brilliant notion occurred to us of flooding the floor of the place, trusting that the otter would feel more at home when surrounded by his familiar element.

We pumped singly and together, and after about half-an-hour's steady toil succeeded in covering the floor with an inch of water, whereupon the otter slid cautiously out and began to investigate. His mode of progress was much as described in the pursuit across the snow. Lying flat on his stomach, his forelegs tucked limply under him, he propelled himself by spasmodic strokes of the hind-paws, worming like a salmon into the nooks and corners in search of a way of escape. We spent a most interesting half-hour watching him. 'But,' said the keeper, 'you wait till my missus comes home and sees this mess; then I shall get otters!'

We made the animal a prisoner for the night in the yard, building a barricade of barrels, weighted with large stones, closely around the space containing him; but such was his strength that he contrived to move two of the barrels

apart during the night, and next morning he was gone !

PLAYFULNESS.

When in danger an otter presses his throat close to the ground, evidently for protection ; and the habit of sliding is peculiar to this animal. In regions where otters are abundant and undisturbed by man they have recognised sliding-places, where a number of them unite for social amusement. A high, steep bank at the water's edge is chosen, preferably where the ground is of clay formation. First of all, such obstacles as stones and roots are removed from the selected site. The otters then slide down the bank into the water, several of them joining in the game, their smooth, wet fur soon imparting a frictionless surface to the clay, so that the game becomes hotter and faster.

Normally, otters have abundant time for play, spending hours together rolling and tumbling in the water much as kittens play on dry land. Indeed, they are among the most light-hearted and peaceful of beasts, being much attached to one another, and desirous of avoiding unpleasantness of any kind.

Otters emerge into the open shortly after dusk, which is their recognised feeding-time. For an hour or so they are busy fishing, and the rest of the night is spent in sportive gambols. An otter comes to know every current and backwash of its home-waters, and all these mighty forces it moulds to its will. First swimming idly upstream, it then stretches itself luxuriously in the central race, and drifting, drifting, is borne under the stars—over the edge of the waterfall, down,

down, into the pounding surf—to be caught by the eddies of the whirlpool and sucked into its very vortex. Drifting limply, yet with every force at its command, the otter plays such games when the lights of the village are dimmed—when the mist-wraiths beat against the alders, and the woods resound with a creeping drip, drip, drip! Rain and wind detract not a jot from its joy of living; moonlight or starlight, its happiness is complete—this creature that knows no enemy other than man and his dogs, and for whom nature has provided so liberally that it spends nine-tenths of its joyous life in frolics.

AFFECTION.

When good fortune permits it, the otter remains mated for life, though naturally many bonds are severed by the activities of otter-hounds, &c. The faithfulness of these animals to one another is very strong, and in this connection a miller living in Northamptonshire tells the following story.

One evening he heard an otter diving and creating a great disturbance in a bed of rushes at one corner of the mill-dam. As night fell the animal appeared to become more and more excited, snorting and calling, and making as much noise as a horse in the water. This he kept up all night, even disturbing the sleep of the household; so next morning the miller went down to ascertain, if he could, the cause of the disturbance. Among some old logs behind the reed-bed he found a dead bitch-otter. The poor animal had evidently been creeping about among the logs, when she disturbed the whole structure, bringing a veritable avalanche on to her head, one of the logs, which still imprisoned her body, killing her

instantly. The disturbance, then, had been caused by her mate, who, refusing to leave her dead body, had shown his grief in the manner described—perhaps with the thought of keeping any intruder from the spot till she came round.

If a bitch-otter is hunted by hounds when she has cubs, she will not leave the vicinity of her holt, though in all probability the youngsters are gobbled up by the hounds early in the proceedings. I remember an incident of this kind when a bitch-otter tried every trick she knew to save her own life and that of her kit's, keeping the hounds busy for over an hour about the same fifty yards of river. During the hunt I saw a big hound chewing up something, which, by its tail, was unmistakably an otter kit, and in the end the poor dam, quite unconscious, floated to the surface like a wet rag, to be snapped up by the nearest hound and killed without so much as a kick.

Before she gave in this otter played every trick known to her kind, and so well known to every M.O.H. On one occasion she lay for ten minutes under a thick scum of decayed reeds, only her nostrils protruding through the scum, while she herself was invisible beneath it. On another occasion she rose under a bush which overhung the water, and from the submerged branches of which long streamers of weed and drift moved with the current. She lay among these streamers, moving in the same limp manner as they were moved, and practically indistinguishable among them. At times whole parties of men and women stood within six feet of her, eagerly searching the water; but it was some minutes ere one sportsman, more experienced than the rest, realised that that dark, drifting thing was not a weed, but an otter!

The other man who had seen her at the first was not there to betray her.

Again, driven from one hiding, she dived, and remained below till her lungs gave out; then, drifting to the surface, she lay there, only her nostrils exposed, while her poor tortured body swung softly with the stream, for all the world like an old water-logged garment—drifting in this way, apparently at the mercy of the current, till imperceptibly she drew near some other place of refuge.

Otters cannot live long under water—certainly not so long as most naturalists make out—two minutes at the most; and when hunted in this way they generally creep out on to dry land when exhausted, to remain at the mercy of hounds and huntsman. This brave little mother, however, kept to the water till she met her fate in the way described—till a dozen lusty hounds and a dozen lusty huntsmen swooped, with a triumphant blast of brazen trumpets, on to her poor remains!

That was the end of the chase—that the crowning glory! A beautiful wild creature tortured out of existence, a wonderful fighting-machine killed without a fight! And yet how the blast of the huntsman's horn brings a ribald flush to the cheek, an eagerness to the footstep, and we feel that we must be up and away—a crowd of swarthy men and a pack of ugly hounds to torture and destroy one small and lovely thing!

THE YOUNG.

The nest of the she-otter is commonly located in a bank burrow, having its only entrance under water or covered by the roots of timber. Usually the kits number three; two, or even one, are not

uncommon. Gestation occupies about sixty-one days, and not more than one litter is produced each year. The young are born blind, and remain so for seventy or eighty days, being directly dependent upon the milk of the dam for fourteen or fifteen weeks. During this period the father plays no part in their upbringing; or, rather, he plays a very important part indirectly, for, though he never sees them, he looks well after the dam, and is eternally on sentry-duty near the holt. The young first see daylight at the age of about eighty days, when, with the opening of their eyes, the mother digs a dry-land exit from the burrow, and encourages them to creep out into the moonlight. They do not take naturally to a fish diet, and it requires many patient lessons and much persistent example on the mother's part to induce each cub to swallow his first finny meal. Each day thereafter the fish diet is increased and the drain on the mother reduced. At the age of about ninety days they are taken to the water. At first they like it no better than so many domestic kittens, and they have to be taught lesson by lesson the art of swimming. One youngster at a time is carried out into the pool on its mother's back, and deposited there to fend for itself. At this juncture the father begins to lend a hand, the dam at last yielding to his burning desire to sniff one of the tiny mites over, and thereafter one or another drifts into his charge.

Their training is not hurried, and many days may elapse ere any of them can be induced to follow their parents under the water. They are taught that the otter who is prepared to dive is rewarded by a delicious catch of miller's-thumbs among the pebbles, and thus by easy stages,

learning first to hunt the shallow water, they acquire the arts on which their success in after-life depends. By the time the kingly salmon reappear they are as swift as the lightning-darting trout, prepared to outmanœuvre and outswim the fittest and wisest of their quarry—to meet it on its own ground and beat it at its own game.

Very often the she-otter locates her nest at some distance from water, in which case it is abandoned as soon as the young are old enough to leave it.

The incident I have quoted *re* an otter attacking a dog may again be referred to. It was early autumn when this occurred, and the tarn, situated in the midst of a veritable No-Man's-Land of desolation, was at least two miles from anything in the way of a trout-brook. The patch of water was not more than forty paces in width, much overgrown with rushes, while the water itself was stagnant and foul with weed. Certainly the pool contained no fish of any kind, yet the ferocity of the otter and the isolation of her retreat would seem to indicate that she had her holt there.

Thus, her presence not being merely a chance passing, she would be dependent upon land-hunting till her kits had their eyes open, and were strong enough to be taken to the river and initiated into the great art of the waterways.

I have known otters to breed three-quarters of a mile from the water's edge, but nesting activities at a greater distance than this are probably rare.

YOUNG FEMALE OTTERS.

An aged angler who had made a lifelong study of the otter's habits informed me that, whereas the dog-kits of a family depart from the locality of their birth probably the autumn succeeding that

event, the she-kits remain in the neighbourhood for at least a year, and probably produce their own first litter quite near to where they themselves were born. The only evidence I have in support of this theory, which I believe to be correct, is that the otter referred to as hunting in the wood during the extreme cold snap was a young she-otter who, presumably, was one of the litter born the previous spring somewhere among the loose rocks at the river-side bordering her home. The rest of the family had wandered off; she alone remained; and this supposition that the she-kits remain resident in the locality of their birth may account for the apparently resident but unmated otters occasionally met with on certain stretches of water.

At all events, the theory is interesting, and, if true, there must be a very definite reason underlying it. Nature's motives may be obscure, but behind each and every one of her peculiarities there is a purpose. Even distribution of the species may be at the root of the reluctance of the young females to leave the region of their nursery-days. If they departed with the rest, it is quite conceivable that when the next mating season came the ambitious young gentry of the species, journeying upstream on their voyages of discovery, would find the head-waters of this river and the next untenanted by the female element, with the result that they themselves would spend the season unmated, and that certain stretches of river, in every way suitable for nursery purposes, would add nothing to the multiplication of the species. In other words, if the she-kits remain, the distribution of the species is maintained within its original bounds, and the young she-otter, who may lack

sound judgment of her own, is at any rate backed by the experience of her parents as regards a suitable locality for her first home. There the knight-errant finds her; there, or somewhere near, little otters are again brought into the world; and in this way the otter population is maintained more or less in accordance with the food-producing properties of the chosen waters.

Other questions revolve around this point. Does every adult otter visit the sea once a year in order to obtain a change of scenery and diet? There is no particular reason why we should believe it does, whereas there are certain facts which seem to point in the opposite direction. In the British Isles such peregrinations are not impossible, but it is hardly reasonable to think that otters found in, say, Canada, one or two thousand miles by river from the nearest salt water, ever so much as sniff the scent of the brine. In certain parts of the North American continent the otters undoubtedly follow the movements of the migrating fish to some extent, in the same manner as does the mammoth brown bear, and that they make immense journeys cannot be doubted; but there are others, haunting waters which the migrants do not reach, that restrict their wanderings to a circuit of inland creeks, certainly never visiting salt water till old age falls upon them, when it is possible that, like the senile caribou and the mammoth trout of the lakes, they wander off into regions they have never seen before.

I believe that in this country quite a large percentage of the otter population, particularly the male element, wanders back and forth between the sea and the head-waters of the rivers; but the

condition of things in other lands proves that a periodical change of diet in the way of sea-fish is not essential in this animal's bill of fare, and therefore it can safely be assumed that the nomadic habits of the species are not caused by necessity, and many of them, no doubt, remain exclusively in fresh water till old and heavy.

If change of diet is necessary for the otter's well-being, it is found in the ordinary course of inland travel. During the early spring, when the courtship of the frog is at its height, many otters leave their home-streams, and, guided doubtless by their hearing, hunt the stagnant ponds in fields and forests in search of frog communities. A pair of otters will in a single night entirely deplete a pool of its frog population, leaving the skins and the eyes of the victims scattered broadcast everywhere. Their liking for frog amounts almost to a mania, and I remember one 'frog pond,' at least a mile from the river, that the M.O.H. always insisted on drawing early in the day—very often with profitable results.

TRAPPING.

If otters are to be trapped at all, it may as well be done humanely, and the beaver set is the most humane method I know. When a beaver is trapped it instantly dives, and such is its strength that, unless measures are taken to prevent it, it will amputate its imprisoned limb. The same applies to an otter, except that a trapped otter is more likely to make for dry land than for deep water.

Find one of the otter's landing-places at the edge of a deep pool. Set the trap here, preferably just under water, and cover it with soft mud. If

possible, the process should be carried out from a boat, as the animal becomes very wary immediately on encountering the scent of man. Attach the chain of the trap to a stake driven vertically into a part of the bed below deep water. The chain should have an iron ring, a loose fit over the stake, at its extremity. The stake is trunnied (so that the ring can slide freely down it), except for two snags left near its pointed end. The first of these snags is short, so that the ring will readily slide over it, but the second is employed to prevent the ring sliding off the end of the stake when, at the close of the operations, the stake is pulled up, in order that the trap may be retrieved.

Caught in the trap, the otter attempts to ascend the bank, but, unable to do so, it makes for the deep water. At this juncture the ring slides down the stake and becomes hitched beneath the first snag, so that the otter is unable to regain the bank. The weight of the trap speedily pulls the victim under, and it is drowned within a short time of encountering the jaws. The dead otter is retrieved from the water by pulling up the stake, which need not be very firmly driven in, the ring hitching up on the bottom snag.

It need not be added that the occasions when the trapping of an otter is in any way excusable are few and far between.

Food.

Many a time has the otter been accused of murders he has never committed ; and I remember a farm-labourer killing one of these poor creatures he found asleep on a tree-trunk because, he said, they were worse than foxes for killing lambs. That isolated cases are on record of the otter as a

lamb-killer I do not doubt ; yet one can live in the midst of otter country all one's life, seeing the traces of their habits every day, and come across no single instance of destructiveness to the property of man. Fish are the otter's birthright, and while it follows that where there are many fish there are naturally many otters, it may be asked, How can this be so if otters are so destructive to our fisheries? I know of certain small lochs which are swarming with trout, and yet which never harbour less than two otters ; and the fact remains that fish maintain their numbers so long as there are only otters to hunt them.

The fact of the matter is that otters do more good to our fisheries than they do harm—firstly, by destroying the eels, their favourite diet ; and, secondly, by killing off the older generation of trout. These trout, if not killed off, become cannibals, each one of them destroying vast numbers of the rising generation of its own kind. The monster lies in the depth of the pool, never rising to a fly, and doing nothing to warrant its existence or to counterbalance the harm it does. Nature can keep pace with the requirements of the otter, and it is only when man steps in that her whole balance is upset. I know certain lochs which used to afford the most excellent fishing when only a few of us and several otters fished them ; but now that hatcheries have been set up, restrictions laid down, and the otters driven away, the fish have either become small and too numerous, or large and given over to cannibalism, so that the fishing, once excellent in its wild state, is worthless in its new. Indeed, I am of the opinion that if some of the carefully stocked and preserved reservoirs of the south of England were

subjected to the activities of otters, the sport they afford would be much improved.

Otters kill a goodly number of salmon on the spawning-beds, eating only a small portion of the fish they kill—sometimes taking only one bite from the back of the salmon's head, and leaving the rest of the carcass to drift away; so that many an old Highland woman, who knows where to look, keeps herself abundantly supplied with salmon while they run, thanks to the activities of the otters.

So long as there are eels to be had, however, an otter will disturb neither trout nor salmon, first ridding the water of these vermin; and so far as otters disturbing the water goes, I have seen trout rising freely in a pool while an otter was hunting all around them.

One hears the otter accused of robbing the nests of game-birds after killing the brooding mother; but I simply do not believe such stories, for the reason that I have repeatedly known water-fowl successfully to rear their broods among the rushes of lochs where otters were to be seen or heard nightly, making use of the tracks the birds themselves used. The fact of the matter is that the otter can more than supply its needs by the natural procedure of fishing, and only in very exceptional circumstances does it trouble to seek a change of diet, such as when the folly of the moorhen proves too tempting to resist, or during the frog harvest. Practically the only exception I myself have come across has been in the otter-killing gulls that roost on the mud-banks of rivers near the sea. An otter, coming up from the sea, may conceivably have struck very bad fishing, in which case it is not surprising that he is attracted

by the crowds of white gulls roosting full in his course of travel.

Let those who find pleasure in the otter-hunt continue to do so, by all means. Sport is a natural asset to the country, and the healthy outdoor variety needs to be encouraged in every way; but there is positively no need for otter-hunting enthusiasts, backed by the daily press, to court popularity and support by emphasising the pastime as a boon to our fisheries and a necessity from the point of view of the angler. Such a course is unfair to the otter, and incidentally, by giving the animal a bad name, does not improve the hunting. How many otters are shot and trapped annually owing to the bad repute in which they stand? Remove all ignorance on the subject, let the otter multiply within reasonable limits, and there will be better hunting and, I believe, better fishing.

I have fished side by side with otters night after night. I have never known the fishing to deteriorate one jot owing to their presence. It is the tyro in waders, who wades where he should fish, and fishes for the most part in the trees, who spoils water. The expert angler who takes, probably, ten times the number of fish does no perceptible harm; and the otter stands out as *facile princeps* among all experts.

LENGTH OF LIFE.

What is the span of life allotted to the otter? Probably it lives longer than a dog, but not so long as a badger. Its slow rate of maturity would seem to argue long life, but I have never heard of one of these creatures living in captivity for any lengthy period. The only captive otter I knew died in its ninth year. Death seemed to be from

some natural cause, yet in its latter days there were no signs of senile decline. A large dog-otter shot in the Wharfe showed signs of considerably advanced years. His mask was almost white ; one of his corner-teeth was broken ; his eyes bore evidence of declining sight. With only guess-work to go on, I should say that sixteen years is the average life of this creature, and at eighteen years senile decay is far advanced.

WEIGHT AND SIZE.

What was considered a record otter, killed in Kirkcudbrightshire, on the Dee, in the winter of 1918, weighed 42 lb. ; 18-22 lb. appear to be the average weights killed inland by hounds. In the 'Kenmure Arms,' New Galloway, there is a stuffed otter that must scale fully 45 lb. The tip-to-tip measurement is generally about 42 inches ; tail, 16 inches.

THE PINE-MARTEN.

THIS beautiful and graceful creature is now so rare that to most people it exists only as a name on the list of our British Fauna. It can still be said to inhabit north Devon, Yorkshire, Cumberland, and Durham, but in all these English counties its occurrence is such a rarity that when one falls foul of the gunner, the event is considered worthy of wide comment in the press. In the north and west of Ireland, the Highlands of Scotland, and the wilder parts of Wales it is a little more plentiful; but it is to be feared that the depredations of this active little weasel must ere long lead to its final extermination. Indeed, if the marten is to keep its place among the wild-folk of our woods, its protection should be made as thorough in this country as is that of the osprey; for, considering its rarity, the era is long since past when the pine-marten could justly be persecuted on account of its destructiveness. The obstacle in the way of its preservation is, of course, the difficulty of inducing any game-preservee to realise, when his preserves are subjected to the ravages of such a visitor, that he is under an obligation patiently to endure such things solely with the end in view of establishing an undesirable strain. Many game-preservees can think no further than the creatures they are out to preserve, and this being so, it is of little use appealing to their sympathies for the protection of those 'undesirables' that are bordering upon extinction. Their extermination is just what the average game-preservee—or, perhaps more justly, the average gamekeeper—wishes to see,

and since the matter is in his hands, little can be done. Legislative protection only leads to secret killing, though it is of value in so far as many gamekeepers are not without their enemies, who, as a rule, are pretty well 'in the know;' but even so, the activities of rural police are not generally unbiassed by personal considerations, which far outweigh their interest in the fauna of the land. The buzzard and the peregrine are on the schedule of protected birds, yet during a recent spring Scottish and Cumbrian gamekeepers made no secret of their destruction; and of two buzzards' nests, one peregrine's, and two ravens' the writer had under observation, the young were in each case destroyed or the old birds shot with the connivance of the local police. One cannot blame the gamekeepers for such activities, for, after all, the preservation of game is their business and the means whereby they live; one can only regret their lack of discrimination in killing such birds as the buzzard and the raven, and hope that some day tenants and estate owners will fall into line with the true sporting gentry of the country, who make the protection of rare beasts and birds a matter of personal interest. 'Like master, like man,' is never so true as when applied to those occupied in the preserving of game, for gamekeepers are, as a rule, a highly loyal fraternity, readily adapting their views to those of their employers, and the keeper who is told to preserve such creatures as he would normally dub vermin will do so with a solicitude just as eager as that which he extends towards his game-birds.

Legislation is effective, then, only up to a certain point, but it cannot prevent the extermination of such creatures as the pine-marten and the peregrine—whose preservation is a matter purely of senti-

ment—unless backed by intelligent interest. The matter lies in the hands of shooting tenants and landed proprietors, and more harm than good generally results from over-zeal on the part of the nature-lover. It has become customary for naturalists to plead the cause of the birds and the beasts they wish to see protected by under-estimating the amount of harm they do, and by putting forth sentimental claims which merely irritate the man who knows. Accurate reports, backed by authentic figures, are far more likely to yield the desired results; and while admitting the regrettable activities of such birds and beasts, we can at least base the plea for their preservation on the fact that their rarity reduces the actual damage they do to a point far below that done by more plentiful creatures. The latter may, on account of their very commonness, escape systematic persecution. The keeper who destroys a dozen gray rats living within his preserves, or who shoots three crows or magpies during his weekly round, has attained results more beneficial to his interests than he would have attained by shooting one peregrine, or half-a-dozen ravens and buzzards.

While it must be admitted that the pine-marten has few characteristics to excite our love and sympathy, it should nevertheless be preserved—firstly, on account of its rarity; and, secondly, on account of its unsurpassed beauty as a creature of the trees. In forests that are given over to the production of timber rather than the production of game-birds the presence of the marten is undoubtedly beneficial to man, as it keeps down the squirrel and rabbit population, and is in no way harmful to young forests. The problem as to whether or not it would actually pay

its way from the gamekeeper's point of view is by no means an easily decided one. True, the marten may destroy pheasant-nests, chicks, and even the old birds; but the question arises as to whether it would do more harm in this way than the numerous squirrels, gray rats, stoats, &c. that it ousts. In this way nature usually strikes a balance to prevent the extermination of any one species, the presence of a large killer bringing about the removal of many smaller killers, the total of whose depredations would be at least equal to its own—a fact which is very easily lost sight of, especially when the traces of the murderer are on every side and the evidence in its favour is purely a matter of conjecture. It must be borne in mind, furthermore, that the pine-marten is a creature of the trees, and far less likely to destroy the nests of ground-birds than are stoats and weasels. Tree-birds of all kinds, from hawks and ringdoves to the smallest songsters, are its natural prey, and its cleverness in circumventing them is largely due to its knowledge as to the whereabouts of their favourite perches. It will lie invisible in the crotch of a tree, and the very instant a bird alights near—while, indeed, the unfortunate victim is absorbed in gaining a footing—the marten darts forth like a streak of light and clinches the matter.

The trouble with the marten is that there is never any telling what it will do next. For a time it may occupy its allotted range without committing any grave offence; then suddenly one night it sallies forth and commits some unspeakable crime sufficient to raise the whole countryside in arms. For this reason I do not see the feasibility of cultivating martens as an ornament to our suburban parks, as advocated by one

prominent naturalist, for it is easily conceivable that a brace of these picturesque little cut-throats, enjoying the liberty of, say, Hyde Park, would establish a highly successful business among the duck community for so long as it was permitted to last.

DESCRIPTION.

The pine-marten is a beautiful tree-weasel, possessing the gifts of all the musk-bearing fraternity to which it belongs, together with several unique accomplishments of its own. It does not, however, secrete musk; in fact, while a weasel in spirit, and of the pukka fighting breed, it seems to have been shorn by nature of the repulsive features most conspicuous in the land-weasels—the polecat, the skunk, the mink, the fisher, and the two smaller members of the family resident in this country. It is so large and formidable a beast that it has no wild enemies on British soil; while all, excepting the fox, the badger, and the otter, probably come within the scope of its destructive powers. Even wild deer enjoy no immunity from the marten cat, for the tiny mottled fawn, lying among the leaves, has been known to fall to it. It will, moreover, dispute the right-of-way with any wildling of our woods, and has been known vigorously to pursue a fox out of its home-range.

The exquisite sable is a marten, though in this country the marten's fur is not of great value. In general colour the creature is chocolate-brown, the longer hairs being richly glistened with sepia and umber. The under-fur is squirrel-red; the paws are generally black; and the tail is long and bushy. The hall-mark of the marten is, however, its flaming orange breast, touched with lighter

shades towards the sides. Sometimes, but rarely, the breast is pure white.

SIZE.

The tip-to-tip length of adult specimens is generally about 22 inches, the tail being from 9 to 12 inches.

The marten differs from the true weasels, among other points, in possessing four pairs of premolars in each jaw, while they possess only three.

IN CAPTIVITY.

In a small town in the Vosges which served as a base-hospital during the war, there lived a tame (beech) marten which afforded me many an hour's happy diversion during brief spells of alleged 'rest' from the line. The town was subjected to shell-fire almost daily, and aircraft usually helped to enliven the hours of darkness; in fact, the condition of things became so bad that there eventually followed an almost complete trek of the civilian population to healthier quarters. This meant the departure of the marten's mistress, duly succeeded by an influx of American soldiers, each intent on occupying in the little captive's heart the place previously held by that lady. Bread, nuts, biscuits, cheese, and chewing-gum littered the cage in unsavoury confusion; but whether these attentions or the shell-fire were responsible, the marten became so fierce and distrustful in disposition that it was the height of folly to attempt any liberties.

I was told that before the war this creature was as gentle and lovable as a kitten, curling itself round the woman's neck in poses of affection, and spending hours gambolling on the veranda and about the eaves while she sat at her sewing. It



THE PINE MARTEN'S LAST LEAP.

was said to be seventeen years of age ; and the son of the house, who was aged twenty-one, told me that he could remember its existence in the yard for so long as he could remember anything. This fact would appear to indicate that the pine-marten is a long-lived creature, albeit the most active and restless of all the wild beasts with which this book deals.

The cage which held the captive was about six feet high, three feet wide, and nine feet long, and the antics it performed in this confined space were truly marvellous. Choosing a quiet time, and sitting at some little distance, so as not to excite the animal's interest, I have watched it for minutes on end looping the loop round its cage at a speed which made one giddy and bewildered to behold. It would mount the wire-netting on one side at a speed which carried it, back downwards, across the narrow span of corrugated iron roof, obtain fresh impetus as it descended the opposite wall, head down, to tap the floor, and bound up the wire again so lightly that the movements of its paws were scarcely audible. It was more like some accurate machine on frictionless wheels than a living creature of flesh and blood. Occasionally it would vary the programme by lengthening the loop, mounting the wire, and descending the wall at an angle from the perpendicular. It must have run miles in this manner every day, and except for the very natural sense of pity one felt for so active a thing in confinement, its evolutions were certainly a joy and a wonder to behold.

Even in this way a captive specimen, with a warm bed and all the food it required at hand, obtained less exercise than was necessary for its perfect health ; so one can readily imagine that a

wild marten, hunting for its living and with all the great woods at its disposal, would hardly prove a sluggard.

The only wild marten I have been fortunate enough to see in a natural state lived in some low crags in the heart of a beech-wood in a secluded West Riding valley. I saw it on two occasions, and each time its behaviour was identical. As I silently approached the foot of the crags it darted from a cranny somewhere among the heather and ferns at the brow of the cliff, and ran up the slanting trunk of a blasted mountain-ash growing from a shelf. Here it crouched, tilting its head first on one side, then on the other, as it regarded me with an air of playful innocence. One could not but be struck by its exquisite beauty—a picture, indeed, amidst its rugged setting; yet in those bright eyes was a hint, the merest hint, of the devilish brain which commanded that death-darting body. After a few seconds of closest scrutiny it descended the trunk a little, as though to obtain a better view; then, like a flash, it was gone.

This was the only specimen I ever knew to exist in the secluded dales of the West Riding, and the marten seems now to have departed even from the wilds of Wigtownshire and Kirkcudbrightshire. Seton, however, in dealing with the Canadian species, comments specially on the marten's powers of avoiding detection. While in northern Ontario we used regularly to take marten in steel traps and dead-falls, but I have never seen a wild one in those woods; neither have I met any white man who has. I remember a correspondence in *Rod and Gun in Canada* some years ago, following an article the writer of

which alluded to the various martens he had seen, in which one trapper stated that, though he had lived in marten country all his life, and took as a rule seventy or eighty marten-pelts in his traps each winter, he had during his whole experience seen only three wild martens at large in the timber! It is possible, therefore, that this beast is not so rare as is generally thought, and that where it exists its presence may be unknown even to the oldest woodsmen. Seton comments also on the animal's preference for dense timber, and on its habit of retreating to more remote cover, never to return, on being disturbed by man; and if this be so in the wilds of Canada, where most animals are utterly fearless of man, owing to their ignorance of his ways, it would certainly apply with far greater strength to the wild martens of our own woods, where man is a much more potent enemy than in a bush country. Among most of our northern hills vast coniferous forests clothe the mountain-sides over great areas, forest adjoining forest, and here occasional martens might live unknown to man, the indications of their work being taken for those of stoat or weasel.

Food.

Mice, birds, squirrels, rabbits, hares, rats, berries, fish, lambs, and occasionally poultry, are, in the order given, the pine-marten's special fare. As the otter has specialised as a water-weasel and become a past-master in the art of swimming, so the pine-marten has developed the art of climbing to such a standard of skill that it can truly be described as the weasel of the trees. Like the otter, the marten is a creature of exceptional gifts; but whereas the first named is of a loving and

sociable disposition, the pine-marten is fierce and solitary, avoiding its own kind at all times except during the mating season.

All the weasels are notorious for their reckless bravery, which often outruns sound judgment, and the marten is by no means an exception. It is both nocturnal and diurnal in its habits; indeed, like the otter, it is one of those creatures which seem never to rest. Probably it curls up in some sunny or sheltered spot after a meal, and when the meal is digested, an hour or so later, sallies forth again on its lifelong pathway of destruction.

Martens have been known boldly to raid heronries, attacking the young birds in their nests, forthwith to be themselves attacked by a croaking, gasping, screeching army of bayonet-armed defenders! Herons readily unite to help members of their own clan, and the marten that failed to make himself scarce when the massed attack descended would have a very thin chance of getting to earth alive. This animal has been known to fall upon a nesting ringdove, shattering the life out of the brooding bird ere she had time to know what manner of death had descended upon her; in fact, any birds that nest in trees, barring, perhaps, the larger owls, are subject to the attacks of this gifted little climber.

The squirrel is no sluggard in the branches, yet compared with the marten it is an indifferent climber. In hunting squirrels the marten is at a disadvantage at the outset, for, being a heavier animal, it must leap sooner and alight later in passing from tree to tree; it cannot run to the extreme end of the slender branches as does the squirrel, and so must take much longer leaps at

every turn of the chase. Well the squirrel knows this, and tries to profit thereby, seeking the slenderest branches and making the longest leaps; yet its chances of escape are as good as nil from the outset. Its stronger and more agile foe is its superior in both speed and distance, and a short run, generally tending earthwards, usually suffices to bring the little drama to a close. The squirrel is caught and killed instantly, then speedily borne off to some fork high up in the timber, where its remains are left to bleach.

Very often, however, in the lightning fury of the chase, the marten miscalculates its own abilities, and if there is no undergrowth to break its fall, it may be crippled or even killed on striking the earth below. Martens have been found lying dead owing to a fall of this kind, and in the slender likelihood of such a mishap lies the squirrel's only chance of escape.

In the Highlands at one time a good many lambs were killed by martens, and the little murderers have been known so to mangle the faces of the defending ewes that, but for man's merciful intervention, a lingering death would inevitably have followed the injuries.

As a raider of hen-roosts the marten is a very occasional offender, save in those localities where it may have become more or less indifferent to the close proximity of man, and in these its raids are common. A half-tame animal is at any time calculated to be infinitely more destructive to man's property than a truly wild one; and whereas a wild marten characteristically steers clear of all human habitation, seeking the most lonely glens and corries, a marten educated out of this highly desirable characteristic will very readily attack hens, ducks,

geese, turkeys, even cats—anything that suggests a meal and a lively exchange of civilities. At the same time, it is not entirely unknown for a wild marten to enter a Canadian trading-post and steal dried fish or other such stores, intended as, though not really fit for, woodsmen's food. Indeed, I heard once of a marten which was caught in a store-room owing to its inquisitive investigation of a patent trap lying on the bench for demonstration purposes, and this at no great distance from Toronto city.

The marten will pursue hares and rabbits in just the same manner as does a stoat, and in the case of a well-seasoned hare the chase is often of considerable length. This may be owing to the fact that the pine-marten is scentless, and therefore incapable of exercising upon the fugitive the same hypnotic effect as do its musk-tainted relatives. (It cannot be doubted that the stink of stoat or weasel is as fear-inspiring to its normal prey as is the very sight of the beast itself, for many animals well able to defend themselves, such as foxes and cats, will turn away in fear from that ominous taint.)

The pine-marten is an expert swimmer, and has been known to live by hunting such creatures as musk-rats and beavers, so no doubt it just as readily hunts water-voles and gray rats, whose swimming powers would not suffice to save them from it. In common with its near relative, the fisher—which, by the way, does practically everything except fish—the marten can be said to hunt for fish only in so far as it will attack partially stranded specimens, lying in such shallow water that they are unable to escape; though one or two authorities hold that this animal will systematically work

a stream, as does a cat, while the trout are running.

Berries the marten eats readily, but probably more by way of medicine than as a staple article of diet; and, so far as I know, this is the only exception to an otherwise strictly carnivorous fare. If facts were obtainable, I believe we should find that all our four-footed, warm-blooded carnivores eat berries to a greater or less degree. From the evidence afforded by the captive (beech) marten in France, I should say that the marten, in spite of its squirrel-like form, strictly eschews anything in the way of nuts.

MATING.

During my early studies of this animal I was of the opinion that at any rate it observed the laws of propriety and decency so far as its marriage customs were concerned—that, indeed, the marten was strictly monogamous, and that both parents shared in the upbringing of their young. The occasional newspaper reports that ‘two martens were shot at So-and-so’ were probably responsible for this belief, together with the fact that I had often heard Highland keepers state that, one marten having been shot, it was usual to find ‘the other’ somewhere near. Unless, however, the British marten differs widely from its Canadian cousin in this one respect, and unless the habits of caged martens serve as no criterion for the customs of free specimens, the marten is totally despicable in its mating habits. In this respect, if in this respect only, its habits indicate a lower standard of sexual morality than that of the common stoat; for in the wild the attainment of a higher standard usually begins with the observance of marriage-

bonds and some sense of tenderness on the father's part towards the young.

Seton says that after the young are born, the less they see of their cut-throat sire the better. He also says that no two martens have ever been known to meet with feelings other than those of deadly enmity. It is probable, then, that the 'mated' couples run together only for a short time, and that thereafter, though their respective home-ranges may not be far apart, they do not associate as mated couples. This would account for their distribution being usually in pairs, while at the same time supporting the probable fact that a marten is a marten the world over, whether caged or free.

Wild British martens kept in captivity behave in just the same way as do those on the fur-farms in Canada. The big cage system, in which a number of martens are allowed to run together in a large confined space, has never yet proved possible. This is owing to the fact that the member of the clan who is strong enough to kill all the rest cheerfully proceeds to do so—or, rather, he kills the survivors of the general *mêlée* with which the social intercourse begins. In this way a cage of promising martens has been reduced to one tattered and moth-eaten specimen when the man came next morning with food for a dozen—a somewhat expensive process, by which, nevertheless, a very fit strain can speedily be arrived at!

Thus fur-farmers, having found that the big cage system merely resulted in providing amusement for one solitary specimen, soon tried the separate cage method, which is to-day yielding good results. Marten-farming, however, is not

likely to prove widely profitable, as owing to the disposition of the marten its rearing is somewhat precarious. Overfeeding leads to infertility, and a large cage must be employed for each individual specimen; otherwise the beast suffers from lack of exercise. The violence of the males is, however, the chief difficulty and the most common cause of loss. The cage of the female must be provided with shelters into which she can retreat in order to escape her lord, though even when every provision is made in this way the female is apt to be killed by the male's long corner-teeth penetrating her brain.

It is probable that in a wild state such mortality does not occur. It is as unjust to judge the characters of wild creatures from examples afforded by their less fortunate kindred kept in captivity, as it would be to attempt to gauge the character of man by a study of prisoners in solitary confinement; and particularly as concerns the mating and breeding habits of animals does captivity upset the natural order of things. How can they be natural when everything that nature gave them as a birth-right is taken away? And we can only hope that a more intimate knowledge of the marten of our woods will finally dispel many of the evil charges which experience with his captive kin has caused to be brought against him.

THE YOUNG.

The wild marten usually adapts a bird's nest as a nursery for its young, though it may choose a hollow tree or a crevice among boulders, in the latter case loosely constructing a nest of grass and moss.

Gestation lasts about ninety days, very consider-

ably longer than with the otter and the polecat ; but whereas the young of the otter are blind for three months or more, the young martens receive their sight at the end of four weeks. In other words, dating from the day of the parents' mating, young otters reach that stage of development when their eyes open at the end of about 150 days, and young martens at the end of 120 days. When they are about six weeks old the parent marten begins to take meat to her offspring, and by about the end of the seventh week they first leave the nest. They are full-grown at six months.

The number of young per litter ranges from two to five. Three is the usual number, and occasionally as many as seven occur. Sir Harry Johnston thinks it probable that two litters per season are born ; but in view of the fact that the first litter must occupy the mother well on into the summer, this would seem rather an open question.

It is probable that the young begin to breed the spring succeeding their birth ; so, considering their longevity, martens cannot be said to be unprolific creatures.

FIGHTING.

The marten has not developed its climbing-powers at the expense of its powers of running. On the ground it is considerably the fastest of all the weasels. A boy of twelve can easily outrun a stoat on open ground, while an otter is comparatively helpless if surprised far from its beloved element. A marten, on the other hand, can hold its own over a short distance against a normal sheep-dog. True, it will tree-up at the first possible opportunity, or seek refuge among the rocks ; but nevertheless it will probably escape

the dogs unless the run be a long one. The marten is a past-master in keeping up a running fight, and will punish an inexperienced dog severely at every effort made to close.

A Canadian trapper wrote me some time ago on this animal's tenacity of life when trapped: 'Mink and marten live longer than any other furbearers we get out here when held in a trap. I have known a marten to live two days, and then to face you with a most diabolical fear and ferocity when you went up to it. Skunk and otter die fairly soon comparatively, but the mink and the marten seem impervious to cold, and will linger on indefinitely. For this reason we usually set our traps on a log elevated from the ground, so that when the animal is caught it falls off and is suspended. They die much sooner this way, and are not so likely to escape maimed. I think the Indian dead-fall is the best for these tenacious animals.'

He continues: 'You ask me about the food of the marten. In summer, I reckon they eat pretty nearly anything they can catch, barring black-bear and moose. In winter, God knows what they eat up in this country [Mattagami River], but the Indians say that the number of martens depends on the number of snowshoes [snowshoe rabbits], which would seem to indicate that rabbits are their staple diet. I asked Joe Long [Indian chief] what you asked about whether marten ever kill porcupines like fishers do, but he said he had never heard tell of it. We generally use partridge [spruce partridge] meat for marten, though they will come for any raw, bloody meat, the same as a skunk—something with feathers on it preferred. Of course, where birds are plenti-

ful the martens kill a fair number in the trees and in the drifts. I don't reckon they suffer hunger anyway.'

STORAGE.

Martens, like weasels and stoats, store food during times of superabundance, but the storage habit is not so strongly developed in them as in the common weasel. The marten leaves what it does not want, and may return for it later if there is no more killing to be done. The creature will leave a partly devoured bird resting in the fork of a tree, and there it may remain for some days, conspicuous as it moves in the breeze, till eventually the destroyer happens to pass that way again.

INQUISITIVENESS.

The marten's hankering to learn and to know is a characteristic by which hunters are often able to profit. The unaccustomed sound of an axe is calculated to bring any marten hearing it to the spot, to peer through the leaves in eager inquiry, then to dart off to the uttermost corner of the forest on having satisfied its curiosity. Any unwonted sound has the same effect, and a trick sometimes practised by keepers is to remain perfectly still, making at intervals the grouse-call by sucking between closed lips through the stem of a pipe. The marten will then come quite near, moving from point to point in search of a better view, and a quick shot probably puts an end to the little creature's craving to see and to know. In the same way it is sure to be attracted by anything moving which it does not immediately recognise, and a common method of trapping it is

to use as a lure some conspicuous object, such as the wing of a partridge, so placed that the bait moves from side to side as the wind blows. A marten will always go for a moving bait even though he is suspicious of it, and such a set generally yields good results, as the animal is not likely to escape seeing it.

SEASIDE HABITS.

More especially along the west coast of Ireland martens regularly become attached to the sea-cliffs, making their homes in the rocky fastnesses, and seldom or never venturing inland. They become almost a cragland species, and, owing to the constant abundance of food, are apt to grow into finer specimens than those inhabiting inland forests.

Naturally the marten is thoroughly at home among sea-cliffs, and a vast variety of food is always at hand. Rabbits are generally abundant among the crags, shore-scavenging rats exist in thousands in many parts, and countless numbers of wild-fowl throng the ledges. These seaside dwellers are said also to quarter the sea-shore in search of shell-fish or any stranded sea-life washed up by the tide.

Probably the day is not far distant when the marten will no longer exist as a creature of our woods, but long after that day has dawned it will continue to hold its own here and there along the coast-crag. It is not likely to be exterminated on the west coast of Ireland for many decades to come, for among those wild and inaccessible crags it is practically secure from man's destruction. The only trouble is that a little marten goes a long way—by which is meant that, since they are

not sociable beasts, two martens for every mile of coast would be a comparatively dense population, and the rising generations that could not claim and hold a hunting-range along the crags would, perforce, have to travel inland in search of their fortunes. So, when the day comes that it can truly be written, 'The marten no longer exists except here and there among the inaccessible crags of the west coast of Ireland,' then the marten will indeed be a rare animal, exterminated in so far as it is possible for man to bring about its extermination.

Is the marten doomed to become extinct? In Ireland, no; but in Great Britain it is most assuredly following the beaver and the wild cat. Our children's children will probably read with regret that 'what is considered to be the last pair of wild martens existing in the Highlands,' &c. The shrinkage of its home-range during the last few years has proceeded rapidly. So far as I can ascertain, it is eight years since the last pine-marten was shot in Wigtownshire, where once it was abundant; while it is entirely gone from Kirkcudbrightshire and Dumfriesshire, where it is a creature unknown to the present generation of gamekeepers, though comparatively familiar to their fathers. The marten can be said, therefore, to have gone entirely from the Scottish Lowlands, or, at any rate, to have become so scarce as to be undetected. In the Highlands its range is slowly gathering in on every side. In England it can only just be said to exist.

Why preserve the marten? Why preserve any other gem of nature or of art? If there is anything at once tragic and pathetic in the ways of Dame Nature, it is that she should have presented this

least lovable of all our fur-clad fauna in the most lovely form. The beauty of the marten is in its quickness, its restlessness, its darting, animated poses—in its very *life*. Take that life away, and there is left but a piece of carrion, no more beautiful than a paper rose. A dead marten is an object from which we shrink, knowing it to have been a bloodthirsty and cruel thing; but to have seen a living marten in the trees is to go your way the richer and happier for the view, for you have seen *Life*—Life radiantly materialised, the most living and lively of all God's moving things.

Is the marten to go? That is what we have to decide, and to decide to-day. To most lovers of the great outdoors the interest of a landscape is decided to some extent by the wild life that dwells therein. One looks over miles of rolling forest conscious not only of its beauty, but of a sense of charm and romance because one can say, 'Herein still dwell the wolf and a thousand other unlovely things God gave when the world was untarnished by man's hand.' One can wander for days in the wild woods of the Highlands, through the lovely glens and corries, gray and cloud-wreathed, endlessly happy in the thought, 'Here the wild deer and the marten have their home.' On the Continent one may view panoramas just as lovely, just as wild, but holding no lasting charm because therein is no wild creature in whose existence lies the true romance of the Wild.

Outside its beauty the marten has perhaps but one feature to plead its case—its rarity. One would plead for the protection of the hated wolf of the northern wilds if it had become so rare as no longer to exist as a source of danger to man and his interests; yet the wolf is not beautiful. We

can gain nothing by allowing the marten to die out, while few would learn of its final departure with feelings other than regret. Our mammals are so few that we can spare but one of them, and that one is not the marten.



THE BADGER.
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THE BADGER.

THOUGH now scarce or utterly exterminated in many districts where once it was abundant, the badger can hardly be set down as a rare animal. In some places where it is still comparatively numerous, its presence is unknown except to a few local followers of woodcraft, for the badger is so much of a recluse, so strictly nocturnal in its activities, and, above all, so cautious in secreting its runways where one would least expect to find them, that the naturalist must first know something about Brock's habits in order to locate him.

Coniferous forests are the badger's chief abode in the British Isles, and he is particularly partial to pine-woods generously surrounded by cover. This is probably because pines grow, as a rule, on water-washed hillsides and ridges where the ground is of sandy formation, which suits Brock's subterranean architecture. Fir-forests, where the undergrowth is rank with bracken and bramble, similarly meet his tastes, and in certain parts of the New Forest, particularly the vicinity of Boldrewood, badgers are as numerous to-day as ever before. In fact, provided one is acquainted with the district, I know of no better country than the New Forest for studying the badger at home.

Amidst the game-preserves of Northamptonshire the badger still holds out in many localities, and considerable warrens are to be found if one knows where to look. In parts of Wales he is common; in fact, Wales may be set down as his true home, so far as Britain is concerned, and the keen and plucky terriers used for badger-

hunting are bred chiefly in the Principality. In most parts of Scotland the badger is now rare, though occasional families are to be found in remote Highland localities.

PROTECTIVE COLOURING.

Judging from its markings, one would conclude the badger is truly a beast of the night. In daylight it is conspicuous, the markings of the face seeming to catch and hold the light; but when at night-time Brock moves among the silver patches of moonlight and the ebony, shifting shadows, he himself is a shifting shadow of silver and ebony—so wonderfully camouflaged that the keenest night-watcher must keep very wide awake indeed if he is to see anything at all.

HABITUAL CAUTION.

I have said that the habitual caution of the badger renders it difficult to locate. One must know where to look and what to look for, as the lifelong endeavour of this animal seems to be to avoid encounters with man and his dogs. I know of one warren situated in the heart of a small, dense pine-forest, surrounded by open fields. In passing to and from this forest during their nocturnal pilgrimages the badgers prefer always to follow the course of a hedgerow rather than venture into the open moonlight. They will even make a detour of two or three fields to avoid passing an open gateway, and in this way they gain a strip of wild undergrowth bordering a stream, which they visit regularly for the roots of the common wild hyacinth. The undulating portions of the New Forest are drained by means of narrow canals or gutters, which

follow the ridings, and are generally about two feet in depth and a foot in width. In due course these canals become overgrown with grass, a pit-fall for the unwary, and they are greatly used by the badgers as runways in passing from one place to another. It is possible for the animal to escape unseen within a yard or so of one's feet by means of these artificial cuttings; but their use entails a counterbalancing disadvantage from the badger's point of view, in that, though he is unseen, he himself cannot see, and should his keen nostrils fail to give him warning, he can very easily be surprised as he noses about the trench-bottom.

The New Forest badgers obtain a good deal of their food from these canals. Beetles, worms, and all sorts of small life fall into them and are unable to escape, while snails, slugs, &c. abound in the long grass and the brambles overhanging the cuttings. On one occasion a friend of mine located a badger simply by the ungenteel sounds of enjoyment the animal made while eating its way along one of these herbaceous tunnels. The ditches are often tapped by an emergency hole from the warrens.

POWERS OF DIGGING.

Seton states that a badger spends thirty hours underground for every hour it spends on the earth's surface, which is probably a pretty accurate estimate. Its whole mode of living is to come up for a few hours, gorge itself to the extreme limits of repletion, then remain underground or about the warren in a more or less torpid state till again hungry—possibly a period of four or five days. On many occasions after a badger-earth has been stopped prior to a meet of the fox-hounds (a fox will readily hole up with a badger), it has

been some days ere the badger inside troubled to unearth the entrances. In some cases he would partially open the hole from within, scratching away just enough earth to admit air, though not sufficient to allow the passage of his body. This was done a few hours after the holes were stopped, and thus matters would remain, perhaps, for seven or eight days, at the end of which the animal would finally take the trouble to liberate himself.

In soft, sandy ground a badger, when disturbed, will sometimes bury himself where he stands, sooner than take to his heels, going practically straight down, like a mole; indeed, his powers of digging are almost proportionate to those of the mole. For this reason it requires a keen and plucky dog to keep a badger in one place in his earth while the diggers get down to him. A half-hearted dog, that does not keep its quarry employed defending himself the whole time, is of no use to the badger-digger, for the badger immediately turns his tail to the dog and begins to scratch, throwing out a blast of sand behind that no animal can face. The dog has to draw off, blinded and suffocated, while Brock rapidly extends his tunnel. If one can succeed in stopping up the pocket behind the badger he can scratch no further, being unable to dispose of the earth he loosens, and thus he becomes jammed up, powerless to escape.

In the hills of the north, where these animals are now comparatively rare, one regularly comes across solitary male specimens, which wander from valley to valley and forest to forest. On hearing that badgers have taken up their abode in a certain locality, it is often found that one of these nomadic old dogs is at the bottom of the rumour. An

old badger, living thus, will convert a chosen patch of land into a veritable warren in a single night, but by the time the warren is located he has betaken himself to the next valley. Thus the would-be badger student, after watching an abandoned prospect shaft for two or three consecutive nights, is apt to become somewhat disheartened, and finally turns to a more fruitful field for his activities.

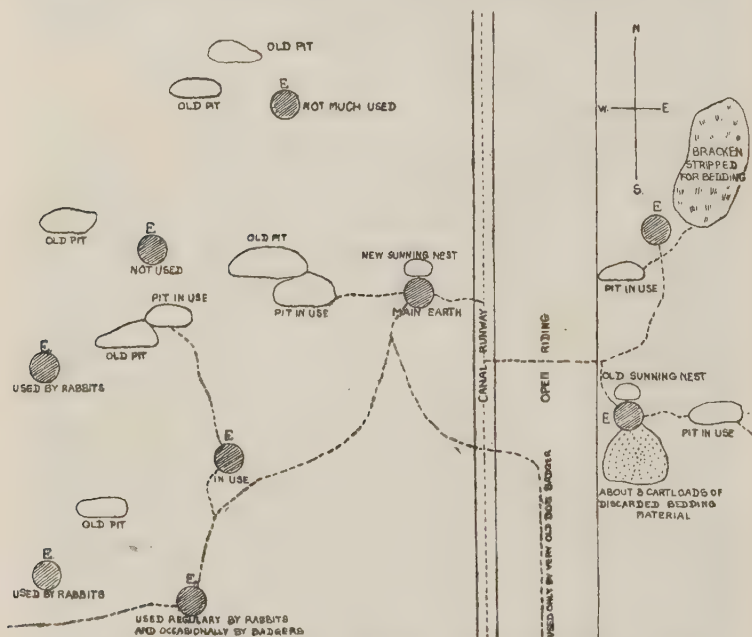
THE WARREN.

The badger-warrens I have studied were all models of system and cleanliness. The animals never occupy the same warren for more than two or three months at a spell; it is then completely forsaken for a corresponding period, and thus given a chance thoroughly to sweeten, the colony removing itself in the interim to another country residence, probably not more than a mile distant. In the meantime their old residence is taken over by rabbits. As regards the numerous stories one hears about Brock as a rabbit-killer, I can only say that I know of numerous warrens in which rabbits and badgers share the tenancy. Generally the rabbits occupy one end, while the badgers inhabit the other, but all the holes are interconnected, and the little community appears to dwell in an atmosphere of perfect goodwill.

The badger is a slow-footed animal, and though perhaps he would possess few scruples if the opportunity of dining off Brer Rabbit occurred, it is not worth his while to hunt his active neighbour when there is so much other food ready to hand.

Badgers are a good deal troubled with neighbours of a more personal and intimate character, and the cleanliness they exercise in their home-life

has not a little to do with these gentry. One can always tell whether or not a badger-warren is occupied by the condition of the bedding that litters the ground and carpets the entrance of every earth—the dry grass or bracken they use being strewn everywhere about the warren and



Plan of Badger-Warren in New Forest, showing Runways, Earths (E), Sunning-Nests, Sanitary Pits, &c.

along the runways. During every night of activity, which appears to be about one night in five, the animals, having fed, spend the small hours raking the old bedding out of the warrens and substituting new, dry material. A bed is never allowed to become old and stale, and the huge dump-heaps at the burrow-entrances will, if examined,

be found to consist of 50 per cent. old bedding, drawn out and intermingled with the sand. Very often a single dump-heap of this kind would form several cartloads—the work of generation after generation of badgers who have occupied their spare time in tidying up and enlarging.

NESTS.

From the mouth of the main burrow there generally exists a clearly defined runway to the patch of open ground at which the bedding material is collected. Dry grass is preferred on account of its softness, but often the badgers make shift with bracken. Following the runway, one arrives at an opening amidst the trees (probably within a distance of fifty yards) from which all the low herbage has been dragged and clawed up, so that the entire plot has an untidy appearance. (Indeed, the whole area of the warren is untidy owing to the litter of bedding, this being the chief indication that it *is* a badger-warren.) This is the hayfield of the colony. All these features are clearly shown on the rough plan-sketch reproduced herewith, which shows the lay-out of a New Forest warren close to the main Bournemouth road, and is typical of many others in the locality.

The grass or the bracken as collected is rolled into tightly packed balls, a number of which appear to be made in readiness for transportation before the badgers leave the field, as one often finds these balls lying forsaken on the ground; and the amount of bedding rolled into such small compass is surprising. The animal carries the ball between its chin and its forepaws, cuddling the bundle against its chest, and half-pushing, half-supporting it in this way.

On one occasion Smith, the keeper at Boldrewood, watched a badger thus occupied in the dusk of evening, being unable to tell what the animal was about as he stood on a neighbouring ridge. It was a small badger, and it had collected rather more grass than it could conveniently carry, so that it had some difficulty in surmounting the obstacles of the runway. Finally emerging into the open riding, the animal made better progress; but here, unfortunately, it caught wind of Smith, and promptly made for the dense cover. The keeper was standing clearly in sight the whole time, but he is of the opinion that badgers (like the bear and the wolverine, and, indeed, all animals of the undergrowth that are short in the leg) are possessed of very poor eyesight. They depend almost entirely on their keen hearing and scent, and I doubt very much if the average badger would recognise a man even at forty paces, and provided it could not scent him, the animal would probably not be greatly afraid.

In addition to their nests underground, badgers make use of sunning-nests, which they construct for temporary use at the mouth of the main earth. This is a point concerning which many naturalists profess disbelief; but having seen such nests and photographed them, I am naturally satisfied.

The sunning-nest is a large and untidy bundle of bedding, trodden out to the curvature of the animal's body, just as a cat or a dog hollows out a bed for itself. It is always placed directly above the mouth of the earth, so that, should its occupant be disturbed, he or she has nothing to do but roll out and tumble underground in the twinkling of an eye. Also, the nest is so situated that it catches the sunlight falling through the

trees during the warmest hour of the day, the nest standing out as an excrescence amidst the darkness of the undergrowth.

Though there are indications that a nest has at one time been in use at the mouth of the main burrow of almost every warren, one may search far and diligently before finding an actual example; for, having sunned himself so long as the light lasts, it would appear that Brock drags the material into the earth after him, making good use of it below rather than allowing it to become damp and rotten on the earth's surface. Thus, if one locates a sunning-nest, and returns only an hour or so later in order, perhaps, to photograph it, a hundred to one it will be gone—especially if one handled it on first arriving. Nor has any man I have met actually caught a badger asleep in its sunning-nest. One might as well attempt to catch a fox asleep in a hen-house. Smith, the keeper at Boldrewood, tells me that on several occasions he has arrived to find the nest still warm from contact with the badger's body, but Brock himself had heard or winded the intrusion, and tumbled underground with seconds to spare.

SANITATION.

In sanitation the badger stands out as a model of system and virtue many beasts would do well to copy, the perfection of his sanitary arrangements being unrivalled by those of any other woodland creature, not even excepting the beaver. Only once have I found any traces of uncleanness about the warren, which in this instance was occupied by young badgers, who evidently had not learnt the full value of systematic cleanliness.

One of the most distinct runways from the main earth will be found to terminate, after a few paces, at a hollow in the ground—often the pit left after the filling in by the earth-stopper of an old burrow, which the family has not troubled to reopen. Here vertical holes (about six inches deep and four inches wide) are dug, each hole being used so long as its capacity permits, when another is dug close to it, and so on till the bottom of the pit becomes covered with these scratchings. Thereupon it is forsaken and an adjacent plot taken up, every warren having several of these special allotments, old and new, within easy reach of the burrows. The amount of deposit left in a single night is really surprising, and the exhaustion of available space for this purpose may have something to do with the periodical abandonment of warrens. It is also true that, after a warren has been in use for some weeks by a large family of badgers, the place is none the worse for a rest.

These few facts are sufficient to excite our admiration for the badger as a beast of cleanly habits. That he is seldom an offender against man I hope shortly to show; and since he is so easily located by those who know him, and so much at our mercy *when* located, having only his own powers as a marvellous fighting-machine with which to withstand our unjustifiable persecution, the lover of wild woodland life has every right to call for the badger's protection. The killing of a badger is never excusable. Dig him out where he is too plentiful, for this must be so at times; but having caught him alive, enclose him in a wooden box and send him to some part of the country where he is rare. Many Scottish landowners would be glad to have him back on their

estates, and would willingly pay for the opportunity. Brock is worth more alive than dead.

INTERCOMMUNICATION.

Badgers, like bears, possess the habit of measuring their full height against some obstacle which affords exercise for their claws, and thither, to the recognised scratching-post, the whole family adjourns at more or less regular intervals to leave the sign of their passing. One sees the claw-marks of father and mother high up on the scale of reach; lower down are the claw-marks of the cubs, each having registered its height; and from surrounding signs we should judge that this is a recognised rendezvous of the family.

There is every reason to think that these scratching-places afford a system of intercommunication for the badger population of a given district, for I have noticed the claw-marks of strange badgers on a tree-trunk habitually visited by one family in a locality where badgers were none too plentiful. For example, an old dog-badger living alone has his own individual scratching-log, which he visits, perhaps, once every ten days. Near to the log is a boulder of rock having one sharp edge against which he invariably rubs himself when calling. Another badger crosses the range, and, guided by some subtle sense, it visits this place. It registers its height against the trunk, and scratches its neck on the other side of the sharp edge of rock. The owner of the rendezvous returns. He knows immediately that another badger has been there. Whether he is sufficiently astute to read if it is larger or smaller than himself is, of course, open to question; but, at any rate, the main fact is instantly conveyed

to his conception. If it is a nomadic old dog-badger that has passed, he is not interested; but if, on the other hand, an eligible lady-caller has seen fit to leave the sign of her passing, he is all on edge. In all probability he follows, and so, in due course, they make each other's acquaintance.

Intercommunication in the wild exists for but one purpose—that of bringing the sexes together. The wolves have their calling-posts, the beavers have their castor-signs, the weasels have their musking-places, and it is reasonable to think that the scratching-post of the badger answers the same purpose as the rest. It is the marriage exchange of the district, the agony column of the local press. Of course, a badger may exercise its claws against any tree it happens to pass, but there is always one tree in particular recognised for this purpose.

Moreover, a badger living in solitude resorts to the practice more regularly than the mated couples—it may, indeed, have several calling-places all up and down its range, and the necessity for claw-exercise alone cannot demand such activity. It would seem that the more earnestly a dog-badger desires a mate, the more blatantly does he advertise the signs of his stature, and the more diligently does he search for the records of other badgers left in the same way. That the habit plays some important part in the multiplication of the species can hardly be doubted, and possibly the old male badger wandering restlessly from place to place is searching chiefly for such signs.

DESTRUCTIVENESS.

I would see the peregrine preserved just as we would preserve a picturesque landscape, a beautiful

picture, or any other gem of nature or of art; but having beheld a peregrine hurtle through a pack of grouse, knocking four of them sideways, and never even looking round as they fell, it gives me infinitely more pleasure to see him on my neighbour's moor than on my own. A good deal of nonsense is talked by naturalists about the non-destructiveness of certain birds and beasts they would see preserved, their service to man, and so on, but generally it would be more useful to refrain from allowing one's keen sentiments to get the better of one's sane judgment.

As regards the badger, I have studied him very closely, and can honestly say that I have yet to discover this creature guilty of a crime sufficient to warrant his destruction even in a single instance. There is no doubt that should he stumble across a game-bird's nest, he will devour its contents as greedily as he will devour the contents of a wasp's nest; but he certainly does not go out of his way to look for the nests of game-birds. In one instance a pheasant brought off her brood amidst some long grass directly overlooked by an occupied warren and within forty yards of it, and had the hunting of eggs been in any way the badgers' line of business, they could not have failed to locate this feast. The fact is that normally in the spring the badger is surrounded by such an abundance of food which requires no hunting that there is no need for him to hunt live prey; and since he is a slow-moving beast, he would not be exactly successful as a huntsman even were he so disposed. True that he has flesh-tearing teeth—and goodness knows he needs them for purposes of self-defence—but, like the

black-bear, he can and does subsist very comfortably on an exclusively vegetable diet, with a little rubbish thrown in, should he actually stumble across it in his short-sighted, pig-like forages. Except in the spring (when the badger has vegetable foods everywhere), the sort of game man protects is chiefly of the variety demanding, and often defying, the swiftness, cleverness, and long-sightedness of Reynard at his best. At all events the keepers of the New Forest, who know as much about badgers as any one, have no quarrel with them except that their many earths require a good deal of stopping before each meet of the fox-hounds, which is the only reason why badgers are kept in check in this region.

Food.

Roots, insects, worms, beetles, frogs, and berries when in season, are the chief food of Brock at home. In the forests of the Vosges Mountains, south of Verdun, there are many badgers, and during the war they seemed to lose much of their fear of man, often appearing on the mountain-roads quite near the muleteers, and occupying the forests right up to the fighting-line, apparently undisturbed by the noise of the guns, since no one had the time to hunt them. Here their food consisted in the season entirely of the wild raspberries that are abundant on the open hillsides, while earlier in the year beetles and other insects formed their staple diet. In the New Forest they appear to live chiefly on beetles, destroying thousands of the common black-backed variety to be found in the roots of moss, the wings of which they do not digest. In winter roots, or almost any other soft substances they can nose out of the ground, are

acceptable ; in fact, the badger will eat nearly anything he happens to stumble across.

HIBERNATION.

The badger does not hibernate in the true sense of the word. During a spell of wild winter weather he may extend considerably his periods underground—may not emerge, indeed, for two or three weeks ; but immediately the conditions change he is up and about, as lively as at any other time of the year. In high, wind-swept country he makes this winter denning more of a permanency ; while in warmer latitudes—the Gulf states of America, for example—the badger does not den up at all. During the chief period of hibernation he generally stops the mouth of the den to exclude draught, which would seem to indicate that his respiration at such times becomes very low ; indeed, it must be something approaching a death-like stupor that tides so heavy-feeding an animal over such a long period without food. But with practically every beast hibernation is merely a matter of convenience, which can be put off when desired ; and even the black-bear of the Far North, which normally hibernates in the true sense of the word, is ready enough to remain awake and active when kept in captivity and liberally fed—even though his home be an Arctic trading-post. In this country, then, the badger hibernates if his environment and the conditions of the season demand it ; but normally his hibernation is on a par with that of the squirrel, eagerly cut short should the wintry weather relent.

THE YOUNG.

I imagine the young, varying from three to five in number, are born in February, as I have observed

their tracks on the 15th of March at the earliest. Generally they are to be seen at the mouth of the earth in March, seldom venturing farther than a few yards till early in April. In May the home den is forsaken, the whole family journeying to a new warren. Sometimes, but not always, the dog and the 'sow' badger remain together the whole year round.

Badgers are not playful animals, and, except in their cubhood, they seldom frolic, devoting their time to the more important business of nosing for food. The old game of King of the Castle is said to be systematically indulged in by the cubs, even their mother occasionally lending a hand. One of the youngsters mounts a dead tree-stump or a boulder of rock, and from this point of eminence menaces his brothers with naked fangs. The others then set to work to drag him down, attacking from every point of the compass, while the central figure twists and turns, till finally he is dislodged and another scrambles into his place. And so the game goes on during the chilliest hour before the dawn; but it is a game unlike those of our own little people in that it is played in silence—such is the degree of caution instilled into the young by their parents.

This game is said to be a recognised institution of the badgers, each family having its own 'castle' and its special little plot laid aside, the ground soon becoming trodden hard and bare of verdure by the beating of active paws. Normally the youngsters just roll each other about, butting at each other and pulling at the loose skin of each other's necks, much like little bears, which they closely resemble in many ways.

Badgers are good-tempered beasts, and the old



THE POLECAT.

L

saying 'surly as a badger' lacks support in actual fact. Naturally Brock is surly when imprisoned in a box and tortured by men and dogs, but I believe that in their home-life badgers live in perfect harmony, with never an ill word. The devotion of the mother is heroic. She has been known, in one instance at least, to hold the den while her little cubs made good their escape, facing hopeless odds, and gamely meeting her death in covering their retreat. On this occasion the warren was invaded because, as the farmers said, the sow-badger had been proved guilty of killing young lambs. When she was dead and the cubs were gone the lamb-killing still continued, and finally it was traced to some far more likely, though less suspected, cause.

FIGHTING ABILITIES.

Many extraordinary beliefs exist concerning the badger. I have been gravely told by country-people that his legs on one side are shorter than those on the other, with the result that he is compelled to walk on the hillsides, where the angle of the ground counterbalances this natural deformity. How he fares when it comes to going home is not generally explained. Presumably he has to complete the circular route of the range! Similarly some peasants believe that the jaws of a badger are provided with a patent locking device, so that, when once he has obtained a firm grip, he is unable to let go. One man actually told me that by thrusting a piece of red cloth fixed on the end of a wire into a burrow you are easily able to catch a badger, in much the same manner as one fishes for crabs, the badger being pulled out immediately he has *locked* his jaws on the fabric!

In the same way one hears that a dog cannot hurt a badger—that he is so tough of hide as to emerge without discomfort from any kind of an encounter with terriers. Nothing could be further from the truth. A badger feels and suffers just the same as any other warm-blooded beast. I have seen the state of a dog after an underground encounter with Brock, and how he will fret and suffer, unable to eat his food owing to the mangled condition of his muzzle, even though every care and comfort man can give him be his. How much worse must be the plight of the poor woodland creature, injured and frightened by the invasion of its sanctuary, and having no human mind to understand or human hand to help! I am convinced that many a badger that has been baited and worried underground emerges in apparent safety, only to hide away and die a lingering death from the wounds about its mouth and tongue. Yet badger-digging is considered by some as the sport of gentry!

To send terriers in to a badger among rocks is a doubly cruel business, for the cruelty embraces the dogs also. A keeper with whom I am acquainted lost both his terriers in this way. The den of the badger was at the foot of a wood, where large and small boulders, overgrown with bracken and fern, lay in wild profusion. One terrier was sent in, but appeared to be in difficulties; so the other was liberated. For a long time the sound of fighting came from below, but suddenly all was quiet. Dusk fell, night followed, but still no terriers. At dawn next day a horse and chains were taken to the spot, and one by one the boulders were removed. Both terriers were found bitten through the throat, just as they had fallen after a terrific encounter,

and there were indications which showed precisely how their deaths had taken place.

At this point the underground passage was barred by a shelf or step, which rose vertically about two feet, the passage continuing beyond it. On the top of this shelf the badger had crouched, so that the dogs were at a hopeless disadvantage, having to leap up at him as he lay, his own body protected, just out of convenient reach. The keeper believed that Brock had brought about the end by resorting to an old badger trick, that of tucking his head down between his forepaws, so that only the tough muscles at the back of his neck were exposed. Immediately a terrier gripped him by this portion of his anatomy he uncurled, so that the terrier's throat was exposed to his fangs, which, of course, settled the matter.

POWERS OF DEFENCE.

I have many times heard it disputed as to whether one terrier is able to hold a badger out in the open. Some assert emphatically that no terrier on earth can hold a full-grown badger that is bent on gaining a place of safety, while other authorities on the subject are equally emphatic in backing their belief that any terrier can hold any badger so long as he concentrates his energies on doing so. The evidence on both sides seems equally strong. Mr Smith, the keeper at Boldrewood, was one night out earth-stopping, when a badger bolted for the very hole he was in the act of closing. A terrier caught the animal at the mouth of the hole, between the keeper's legs, and in the scuffle that followed the lamp was upset, and a general *mêlée* ensued. Nevertheless, the terrier was successful in preventing the badger from

gaining earth ; and this, be it noted, within a yard of the burrow-mouth, when the animal would undoubtedly put forth all its energies to gain the goal so near at hand.

On the other hand, an experiment was carried out in order to settle a wager between a Welsh landowner and the owner of a set of terriers reputed to possess exceptional mettle. The landowner was convinced that four of the terriers could not hold a badger out of cover, and the proud owner of the dogs was equally convinced that they would not only hold him, but would make very short work of his execution.

Accordingly the unhappy badger was taken into the centre of a field and dumped, blinking, out of a bag. Gaining his bearings, he began to amble off for the nearest cover ; whereupon the terriers were released. They immediately closed, but the running fight continued steadily in the direction of the patch of cover. At times all four terriers gained a hold of the unfortunate beast, yet doggedly and persistently the badger bore on his way, and in a very short space of time disappeared underground at the very feet of the surprised dog-owner, who, resultantly, lost his bet !

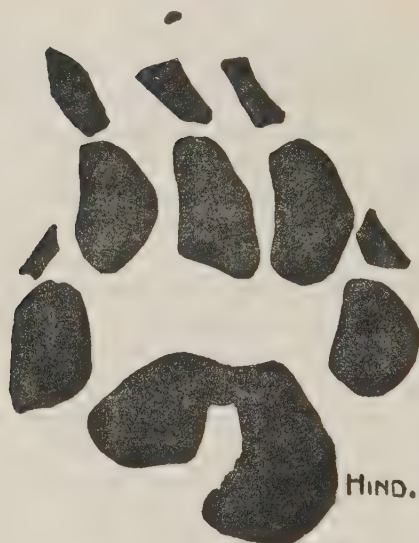
Of course, there are exceptional badgers, just as there are exceptional terriers, but I doubt very much whether any terrier could hold its own in single combat, either closed or open, with an old fighting male badger or with a sow defending her young—assuming that the badger had not previously been scared out of its wits. Though retiring and peace-loving by disposition, this animal is a fierce and terrible fighter when roused, and long persecution has taught the badger to use its fangs and claws with deadly effect. Even when terrified by

man, and forced to make a stand amidst surroundings and conditions new to it, a good badger will hold its own for an indefinite period against entirely hopeless odds; and fighting amidst its own chosen environment, uninterrupted by man, it would very speedily wear out and probably kill a terrier handicapped by the conditions that were in the badger's favour. In other words, let Brock choose his own ground and do not interfere, and it will go badly with the terrier facing him, even though the latter be of the best fighting blood obtainable.

The front part of a badger's skull is extremely strong, like that of a bear. (In bear-hunting one never shoots at the head of the beast, as the thick, slanting skull is very apt to deflect the bullet, and a blow on the skull has the effect of sending a bear temporarily mad. The neck is the proper target, as one then stands a chance of severing the jugular vein or of paralysing the animal by injuring the spine.) The back part of a badger's head, however, is extremely poorly protected, and a blow behind the ears stretches him out instantly.

HOW TO IDENTIFY HIS WHEREABOUTS.

The best way to locate any animal is, of course, by its tracks. Learn to read the writing of the woods, and half their secrets are yours. The spoor of the badger is easily recognised by what keepers call the 'bar.' This is the oblong or oval tread of the ball of the foot, which in most other animals leaves a round, or almost round, indentation. Also, a badger-track is considerably larger than that of any other wild beast likely to be sharing its environment, and once the track has been seen, there is no mistaking it, as it is so distinctly *sui generis*.



HIND.



FORE.

Track of old Dog-Badger, actual size. The fifth toe does not leave an imprint except on very soft going.

A badger-warren can always be recognised as such by the litter of bedding that strews the earths and the runways; while if there are badgers in the district they generally advertise the fact by rooting up the ground, in the same way as a family of little pigs. If the earth is nosed away round the trunks of fir or pine trees, so as to explore the bark below ground-level, it is assuredly the work of badgers, this being one of the most certain tell-tale signs they leave. Perhaps some grub to which they are very partial exists round the trunks of these trees; or it may be that insects, particularly wood-lice, follow the trunk of the tree and seek hiding and shelter just below the earth-line, where they are easily nosed out by the badger.

A trick which I have tried with success, when in doubt as to whether or not badgers were in a certain locality, is to bury a few raisins two or three inches underground near to the suspected spot. The keen nose of the badger is sure to locate these dainties, and he will root them out when next he sallies forth on his nocturnal wanderings.

The foregoing will serve to show that there is much to rouse our sympathies in the character of this quiet dweller of the forest shadows, and it is sincerely to be hoped that such sympathies may prove instrumental in relieving this ancient and much-persecuted creature of some of the miseries that have so long and so unjustly been its lot. One sees in the badger a brave, indigenous beast struggling to retain a footing in the land of its heritage against the cruelty and ignorance of those who still seem to regard it as designed for the 'sport' of man. The badger was once diurnal to almost the same extent as it was nocturnal. Where

undisturbed by man it is still diurnal in its habits. In this country, through sorrowful experience, it has become solely nocturnal. It has retreated to the depths of our deepest forests in the hope of finding security from man, and every movement of its life is characterised by the earnest desire to avoid encounter with man and his dogs. Because the badger is a brave and an able fighter, it has been used as a means of trying out the mettle of beasts as brave and able as itself, which, in the broad light of things, savours of the barbarous, and of a spirit hardly worthy of the lovers of cricket.

DIMENSIONS AND WEIGHT.

The measurements of an adult female killed in Yorkshire were—from the tip of the snout to the root of the tail, 31 inches; tail, about 7 inches.

The only two badgers I have ever weighed were evidently far below average; they were $16\frac{3}{4}$ lb. (female) and $14\frac{1}{2}$ lb. (male), both killed in the New Forest. The average weight of the Cornish badger is given as 30 lb.; and, according to Sir Harry Johnston, the heaviest specimen known was killed in Warwickshire, and scaled 43 lb.

THE POLECAT.

Known also as the Fomart or the 'Fitchet.'

FROM the polecat tribe spring our tame ferrets, the dark variety of which is distinguished from the more common albino strain by the designation 'polecat' ferret. The polecat is, in fact, a wild ferret, and has often been trapped in the act of visiting the cages of tame ferrets, with which it will readily interbreed.

The polecat is to-day a rare animal, and except for the sorrow one naturally feels at the loss of any one of our fauna, there is no special need to regret its rarity.

SIZE AND DESCRIPTION.

This animal is the largest of our true weasels, and an adult male will measure 17 inches from the tip of the nose to the base of the tail. The tail, which is of the bottle-brush variety, measures about $6\frac{1}{4}$ inches. In all the true weasels the female is very much smaller than the male, and an adult female polecat seldom exceeds 18 inches, tip-to-tip measurement.

The colour varies with the altitude, and, to a less degree, with the seasons, sunshine and warmth being conducive to darker shades. The lips are white, enclosed by a belt of dark brown encompassing the muzzle and the eyes. A lighter band of gray succeeds this marking, and includes the forehead, the temples, and the cheeks. Sometimes this band is quite white, and the dark colour begins again behind it. The ears are white-rimmed, and

the body-colouring varies from quite black to a pale ochre. The general impression of the summer coat is usually a blackish-brown, and in old specimens the hair is sometimes found to be matted, like that of the fisher. Its call-notes and its menaces are identical with those of the ferret.

CHARACTER.

In character the polecat is no more lovable than are its congeners, the stoat and the weasel, and, being a larger and stronger animal, it is far more destructive to man's interests. It feeds on anything and everything it can catch and kill. It never engineers a home of its own; and though probably less nomadic than the stoat, it will live for weeks within a limited home-range, sleeping where and when convenience dictates. In habits it is both nocturnal and diurnal; that is, it hunts when hungry and sleeps when fed—a state of things which applies to most of the blood-loving 'killers.' If it feeds in a warren, then in the warren it sleeps; if it kills its prey in the open, it speedily drags the victim into a cranny, and there, having fed, it rests till such time as it is hungry again. I do not think the polecat adheres to any particular denning-up place except while its young are small.

In common with all the true weasels, the polecat destroys for destruction's sake. On coming upon a brood of pheasant-chicks, it will kill every chick in the brood, finally carrying one of them away to feast at leisure. If it visits a poultry-yard, the same process is followed. It will kill turkeys and geese too large to be dragged away. A brace of polecats, hunting together, have been known to attach themselves to an extensive rabbit-warren, and in a comparatively short space of time so to deplete the

burrows as to spoil their own hunting, thus forcing themselves to find fresh quarters.

On game-reserves the polecat is undoubtedly the most destructive of all the weasels—ininitely more so than the marten; and while the latter has beauty to recommend it, the polecat is perhaps most remarkable for its offensive stink. Its rarity alone warrants such protection as may be forthcoming.

Living at Upton, near Northampton, the writer, when a boy, one day put up a polecat in a root-field quite near to the house. It bounded off after the manner of a ferret, and was sufficiently swift to gain a strip of coppice about a hundred yards away ere two spaniels could overtake it. Doubtless it was attracted to the vicinity of the house by the cage of tame ferrets kept in some outbuildings.

Subsequently the same dogs pursued the creature several times, but never succeeded in outmanœuvring it, and in due course it disappeared from the locality.

Some weeks later my brother and I were walking up a fallow field about three miles from the house, when the polecat suddenly appeared, bounding along a furrow at some considerable distance from us. My brother gave it the 'choke' at long range, whereupon it arched its back and bounded along sideways, uttering the familiar clucking challenge of an excited ferret. It was, however, very slightly wounded, and made good its escape.

Up to the last fifteen years polecats were comparatively common on the wild stretch of moorland that lies between the upper basin of the Wharfe and the Nidd valley, and keepers and shepherds used regularly to trap and shoot them. I remember, in boyhood, seeing as many as four

freshly killed polecats, destroyed by the shepherds, nailed to a barn door at Gate-Up Gill, Grimwith ; and I recall an exciting chase after another of these creatures in that secluded moorland district. It hissed and chattered at us as it bounded from cover to cover amidst a fusillade of stones and sticks, and going up to the place later, we found a filthy brown secretion left on the rocks over which the terrified creature had run !

On this moor, as on others, the destruction of the polecat was so vigorously pursued that since about 1905 it has no longer figured among the moorland keeper's foes, and it is probable that in less wild regions its extermination was considered complete long before that date. Even in the wilds of Scotland it no longer holds a place in the list of living 'vermin,' while in the Lowlands it is practically extinct. In England occasional specimens occur from time to time, particularly in Hampshire, Cumberland, and Durham ; but so rare is the founmart that, even when one is in intimate touch with things of the fields and the woods, news of its passing is seldom gleaned.

Food.

In addition to the articles of diet already referred to, the polecat feeds on snakes, lizards, frogs, fish, and eggs. In moorland districts lizards and mice are probably its staple summer diet ; in winter it feeds largely on birds that roost on the ground—larks, redwings, and game-birds.

There seems to be, at any rate, a foundation of truth for the old belief that the polecat feeds largely on frogs. It has been said that a nesting polecat bites a frog through the head so as to paralyse but not kill it, and in this unhappy plight

the amphibian is carried off to the nest, where it is stored to await the pleasure of the family of budding cut-throats. One observer claims to have found a regular horde of live, paralysed frogs stored up within reach of the young polecats.

Be this as it may, stoats and weasels feed very largely on frogs and even toads. A ferret, too, appreciates such fare. I have known a lost ferret to live for several weeks along the bank of a stream where there was little food for it other than frogs and toads, on which it fared so well as to be in perfect condition when ultimately found.

NESTING.

The polecat is most at home in loose, rocky country, broken by strips of forest, with the sandy earth liberally tunnelled by rabbits. The nest is commonly situated in a rabbit-burrow, though any suitable cranny will serve the purpose. I knew one pair to breed in the foot of a high boundary wall between the pine-forests and the heather of the moors. This ancient structure was about twelve feet in height, and was built of massive boulders at its base, gradually decreasing in size towards the coping. The polecats did a good deal of their hunting along the base of the wall. Hares, from the lowlands, had their creeps through it leading up to the heights, and the rabbits from the heights had to pass through it on their way to and from the lowland pastures. A large number of rabbits lived permanently in the thick base of the wall, and repeatedly the polecats were seen by shepherds working their way along the structure. This was in Upper Wharfedale.

The polecat is particularly partial to deserted and partially ruined buildings, amidst the tumbled

masonry of which it makes its stronghold and rears its young. It is also said to breed in the thickets of whins, to which it is probably attracted by the rabbits which habitually make their home amidst such thorny shelter.

The young, which are born blind, come in May, and number from four to seven. Only one litter is produced annually; and since the sexual excitement of the species—that is, the time when the males become most restless—is about the middle of March, the period of gestation is probably about seven weeks.

Apparently the polecat is no less monogamous than the stoat. When permitted to do so, a mated pair remain together at least from early spring till the hardships of winter necessitate for each a separate hunting-range; and where food is plentiful, they may remain united throughout the winter. The young accompany the parents till almost full-grown, though the family union does not appear to be so strong as is the case with the other true weasels (stoat, weasel, and mink).

HUNTING.

In hunting, the polecat follows the mode of procedure adopted by the stoat; that is to say, it hunts above ground, and does not adapt itself to the use of underground alley-ways and passages to the same extent as does the weasel. When hunting it listens repeatedly, sitting bolt-upright, drawn this way and that by every sound it hears. If startled or alarmed, it instantly darts underground, presently to peer with caution from a distant cranny, taking stock of the situation. In disposition, it is less given to arguing the point than is the stoat; that is, it does not chatter abuse

for the sake of hearing its own voice, but will, if possible, make clean away from the danger-zone.

The polecat is a good swimmer, and will take to water readily in pursuit of its quarry. It is less arboreal than the stoat, though it can climb moderately well. One was shot in the act of climbing a wire-netting screen some ten feet in height. It was near the top and making good progress, and on the other side of the screen were about two hundred quarter-fledged pheasant-chicks! This was near Brancaster, in Norfolk.

THE BROWN HARE.

ONE of the marvels of wild nature is that the hare survives—not only survives, but, if given any chance whatever, thrives and multiplies. It is one of the few wild-folk to whom nature has given no secure sanctuary. The common prey of all, pursued first by one, then by another, only its marvellous speed and its superb staying-power enable the hare to hold its own against so many foes. The foxes and the rabbits have their burrows, but the hare has no such shelter; he meets his foes on their own ground, and beats them at their own game. He is a superb running-machine, wise in the wisdom of the trails, and withal a joy to behold. Away he goes—starting from a tuft at our feet, floating, gliding, over the pasture, light as a thistle-seed, keeping always to the hollows, seldom showing himself on the skyline. And what lover of the great outdoors has never felt the desire to follow on in wild pursuit?

Truly he is the common sport of all, this creature which is always game to the end—living a life of hair-breadth escapes till he can hold out no longer against his foes. Particularly is this so when the snow is on the ground; for it is not the hard, swift run that kills the hare; it is the slow ‘tramp, tramp, tramp’ of a dogged pursuer on his trail. In times of snow the shepherd and the farm-man know that the hare is at their mercy, and taking down the old gun from its shelf, the hunter sallies forth. Here is the quarry’s over-night trail; there is nothing to be done but follow that



THE BROWN HARE 'AWAY!

chain of tracks to the winter form, which is found in a sheltered hollow of the pasture, facing south. The man stops short in readiness ten paces away. The tracks lead to that tuft, but beyond the tuft the story of Jack's life, written in the world's oldest writing, ceases abruptly. Stooping, the man picks up a twig, and throws it at the tuft; then away goes the hare, ears laid back, eyes watching behind, eager to place some obstacle between himself and his pursuer. There is a loud report, a squeal, and the hare zigzags; another report, and silence. There, tinting the snow with his life's blood, lies the hero of many a fiery run, who owes his fate, like so many of his kindred, to the tell-tale writing of the snows!

One glorious winter day, when there was a light tracking snow on the ground, I saw a run which opened my eyes as regards the staying-powers of the hare. I was high up in the hills, commanding an incomparable view of the wide valley, and had with me a hound which was both fast and powerful. Putting up a hare, the dog set off in pursuit, pressing the animal hard down the mountain-side; for, owing to its long hind-legs, a hare is not at its best when running downhill, and has often been known to fall badly. Once in the valley, a mile away, the hare began a wide circuit, over field after field, round the village, over the pine ridge, and across the burn, the dog, with lagging steps, following by scent now. Yet another circuit of the Boulder Hill, adding three more miles, much of the pursuit hidden from our view; then we saw the hare again on our side of the hill—saw him pause and listen, deliberately tying knots in his trail. Finally he sought the cover of the frozen swamp, and after

some minutes the dog reappeared, tongue lolling, almost at a walk. Skilfully, yet laboriously, he unravelled the tangle of tracks, headed for the swamp, and again put up the hare.

Numbers of people who had seen or heard of the chase now began to appear at gates or on the hill-tops to watch the sport, and the hare once more set off, now with weary steps, but nevertheless leaving the hound. Behind a gate a labourer was waiting for him with one of the fastest, best-winded sheep-dogs in the country, and the poor exhausted hare ran right into them.

Was he exhausted? Be that as it may, he instantly doubled his speed, breasting the steep mountain-side at one long, floating glide. Up went the little spurts of powdery snow from his heels, and between him and the fresh dog the white expanse of snow rapidly grew in width. Up the mountain-side he came, passing quite near, and behind him that great iron-limbed hound. Down into the valley once more, round the village, over the burn, then westward through the foot-hills—hard pressed now. Through Bethman's farm-yard, scattering the hens; and then—Bethman's dog was after him, the third fresh dog, running hard and fast, and gaining, gaining, gaining!

At a gate a woman turned the hare—through the churchyard then, and along the road, down the steep bank to the river, here ninety yards in width and thundering between the rocks. We watched long for him to emerge on the other side; but no. We saw Bethman's dog, dripping wet, come back; and just then my old dog, still patiently following the trail at about three miles an hour, came plodding towards us, imagining he had done marvellously.

‘That hare is drowned!’ we all agreed, and went our respective ways.

But just on the edge of dusk, as I was descending the mountain-side, I saw a very tired and bedraggled hare wending his way towards me. Constantly he paused and listened; then, making off by the old familiar runs, he departed into the gloom, heading for the mountain heights.

Did I recognise him? I can’t swear to that; but I know there was only one hare on that part of the mountain-side, and I know the hare I saw, returning wearily home at dusk, followed the private runway of the creature we had pursued.

How far will a hare run before dogs? Some say eight miles at the most. Personally, I think eighteen a fully conservative estimate. Before a pack of hounds he will not run far, because his spirit is broken by fear; before a single dog no faster than himself he is capable of putting up a very different show.

HABITS WHEN PURSUED.

Each hare has its own runways—or, rather, passes to and from its feeding-grounds by the same routes. Normally it will never go through or over a wall if there is a gateway through which it can pass, and it is to be feared that this partiality towards open going often proves the hare’s undoing. The poacher knows it well, and has nothing to do but place his net across the gate-gap, and then drive the hare into it, using his snares in the same way. But occasionally an old hare knows these things, and once having been frightened, he never faces a gate again.

The hare is one of the few animals that can see behind it as it runs, and it is owing to this

faculty that the animal is so well able to dodge hounds at close quarters, doubling and twisting in the ace of time, and thus tiring and disheartening its pursuers when every one thinks the run is at an end. So absorbed does the hare often become in looking behind that it forgets to calculate for danger ahead; and many a hare, pursued by dogs, has been known to run into the legs of spectators, never seeing them, so intent was its backward gaze.

Most motorists have indulged in a short, if unsuccessful, pursuit of a hare, the animal sticking to the open roadway ahead of the car, watching the vehicle as he runs, never thinking of turning aside till the car is actually on him. Pursuing a hare thus, I have timed it by speedometer to maintain a pace of twenty-eight miles per hour over a short distance, which seems about the animal's limit.

One wet night I was motoring near Birmingham, when a hare got up in front of the car, and positively refused to get off the road, setting the pace for over two miles. During the run we noticed that the lamps were getting dim, and it appeared as if we were passing through a heavy shower. Finally the hare dodged off, and descending, we discovered that the dimming of the lamps was due to the mud thrown up on the lenses by the hare's hind-legs! The whole front of the car was literally drenched in dripping mud, the wind-screen was opaque, while we ourselves were splashed about the face. One would never have believed so small an animal was capable of displacing so much liquid in so short a space of time.

The hind-legs of a hare are most abnormally developed, for, like those of the kangaroo, they

are the animal's propelling-members. Often the creature's life is dependent upon a sudden, lightning spurt—shooting off into space to foil the first dash of Reynard, who has discovered it in its form, and knows well that if once the hare gets on its legs the game is up. A hare has even been known to break one of its legs in shooting off the mark, the bone proving insufficiently strong for the sudden strain thrown upon it. The fore-legs are comparatively feeble, functioning more or less as pivots over which the creature bounds, and it is because the forelegs are inadequate for the strain thrown upon them by the gigantic bounds that a hare is so much at a disadvantage in going downhill. If by any accident one of the hind-legs becomes injured, the cripple will most assuredly disappear, for, robbed of its powers of flight, it can no longer hold out against its many foes. The first fox it meets knows instantly that 'there is something wrong with that hare,' and Reynard soon succeeds in profiting by the poor creature's disablement.

LIMITATIONS.

A good hare will run any ordinary dog to a standstill, with miles of energy to spare; but though one of the most marvellous running-machines in creation, he is, nevertheless, a creature of mortal limits. Pursued by beagles, bounding ahead of them mile after mile, and keeping them on the distant skyline, in the end he mounts a wall as a point of observation, and hounds and huntsmen, coming up, find him crouching there, still watching his back trail! But it is a limp and lifeless form the huntsman tosses to the hounds; for here, again, the old, old tricks are

set at naught, the marvellous uphill sweep has failed to leave his pursuers behind, and he has died as he has lived—watching his back trail. Looking behind! That is why he holds the roadway ahead of the motorist; that is why he often falls when descending a mountain-side at speed; and be his last effort the act of climbing to a point of observation, or launching himself into space in a final supreme effort to outstrip his pursuers, he is always looking behind.

No creature has so many foes, no creature is so widely coveted. Snares, nets, dogs, guns—these are but a few of the perils that beset him every hour of his life; yet he has survived, while so many wild-folks that once shared his habitat have quietly laid down their arms and retired from the field.

DISPOSITION.

In disposition hares are the most solitary of all four-footed, warm-blooded things. They never associate except for the brief period of the honeymoon, being, of course, polygamous animals. Something of the solitude of their disposition begins to show immediately after birth, when very often the youngsters separate, and each makes for itself a solitary form, uniting only when the mother calls them at meal-times. If two hares be started side by side, they invariably run in different directions, the only exception to this rule I have come across being that subsequently recorded of two Jacks running together to engage in combat. If a honeymooning couple be flushed together, they separate immediately, to reunite later on, guided as to each other's direction by their sense of smell. The scent-glands are highly developed, purely for

mating purposes. Were these glands less developed, the animals would never find each other where mating is most necessary for the survival of the species—that is, where hares are few and far between. I have never heard of hares uniting in any way purely for social amusement, though such a thing does not seem to be unknown among certain northern varieties.

NATURAL AND ACQUIRED ENEMIES.

A wild animal has two kinds of foes—hereditary, and those which are brought about by a change in the conditions under which it lives. The former it contends with guided by inherent knowledge, which is instinct; the latter it learns to circumvent only by experience. The hereditary foes of the wild hare are the fox, the weasel, the hound, even man himself. Against each of these the hare has its means of defence. A young hare that has lived its life in perfect immunity instinctively dodges through a narrow opening to baffle a pursuing hound, and as instinctively doubles back and leaps aside when going to its form in order to delay a pursuing stoat. All these tricks, clever in their way, are the outcome of endless decades of experience; they are, indeed, inherited habit. A young hare obtains little or no education from its mother. The fox-cub or the otter-kit is taught by its parents, lesson by lesson, the things on which its later life depends; but this does not apply in the case of the hare. The leverets leave the dam when about a fortnight old, and each day thereafter they become less and less dependent upon her. Her duty in life is merely to suckle them; and as they become independent of her for support, the family bond is split asunder, and leveret and mother live

their lives apart. Not one single lesson as regards the circumventing of their numerous foes is taught the young hares by their mother, yet they grow up to hold their place among the wildest of all four-footed things.

Among the comparatively modern enemies of the hare, regarding which it must learn by experience, are the hempen-net, the snare, and the net set across the open gateway. If hares, like foxes and deer, possessed among their gifts the ability to hand on their experience to their children, then these modern engines of man would be set at naught by their cunning. A hare lives to grow wise; by chance rather than sound judgment it has evaded death time and again ere, in its old age, the wisdom of experience is added to its inherited knowledge. But the children of that hare profit in no way by its learning. They are as unsophisticated as regards the modern engines of mankind as are the first brood of a dam who has lived in perfect security. This is yet another factor that makes it difficult to understand the hare's powers of survival. It is surrounded by foes; anything that can catch a hare can kill it; it is prone to all the ills and ailments of mortal flesh—barring, perhaps, kleptomania and orator's throat; the knowledge of the parents is denied the children—they have no friends or guardians, save the strength and agility of their own hind-legs and their own powers of reproduction. Truly the hare is among the marvels of modern existence.

My sympathies are all with the village poacher, though hating the petty meannesses and unmanly vengeance peculiar to the class. The hare is a glorious creature of the chase, to be coveted not so much for its value as so much meat, but for the

joy of having outwitted a wary quarry. The hare-poacher, whatever he may be as we see him to-day, the product of rough beds and tap-rooms, must at some time of his life have possessed a very real love for the great outdoors, backed by a sense of romance concerning the life that dwells therein. Meagre results, irregular hours, a temperament which shuns the prescribed pathways of life for an existence of freedom and excitement, have reduced him to what he is as viewed by the world at large; but beneath the rough exterior there often dwells a spirit of kindly and sympathetic understanding. He might, indeed, have been a poet, had not society designed for him the fate of the moucher.

Concerning the hare's modern foes, it is interesting to note that in bush countries, such as northern Canada, man is not among the hare's natural foes. I have sat by a camp-fire in the Ontario bush, and seen a 'snowshoe rabbit' hop to within reach of my axe, and sit there calmly grooming itself. Yet these same hares, which simply did not recognise man as an enemy till they had learnt by sad experience his true nature, would bolt from a dog, and put up as fine a run for their lives as any creature of their size in this country. It was merely that the dog came within the scope of their hereditary foes, while of man they possessed no inherited dread.

Will the hare come in time to eschew the open gateway or the gap in the boundary wall? Will the hempen-net and the drift-net and the snare some day rank among this animal's hereditary foes? Not in our time, nor in the days of our grandchildren's grandchildren. Such knowledge takes as long to acquire as the growth of new teeth to suit changed conditions of diet, or the cultivation of

a new coat to suit a landscape which has changed in colour. It is not a matter of ten years, or yet of ten hundred, but of unchanged conditions throughout immeasurable time, that produces inherited knowledge.

The wolf and the coyote have learnt the meaning of strychnine and of the buried trap, and how to evade them. They have changed with the times; they have become modernised, and thus have managed to hold their own. But in their case the experience of the parents is handed on to the children; only thus have they survived, and the hare is denied the privilege which comes to them as a birthright. He is a creature of the open, trusting solely to his superb powers of flight to evade his foes. Denied the benefit of the experience of his parents, he will make for the open so long as he is pursued, and will fall to the poacher at the gap or the gateway at which his mother and his mother's mother fell.

A good many hares are killed on the railway-lines, and a railway workman employed in Norfolk told me that in the early summer, when the young hares of the season are first abroad, he procured many a Sunday dinner in the shape of a partly mangled hare found on the line. Evidently they run in front of the train just as they run ahead of an automobile on the road, sticking to the open way instead of turning aside and so out of danger. An old hare, however, is seldom killed thus, just as an old partridge is seldom killed by flying into the telegraph-wires.

MATING.

March is the hare's love-making season; hence the saying, 'Mad as a March hare!' Hares are

truly mad in March, and during that month many a stern battle takes place between the gentlemen who, unfortunately, fall in love with the same lady, which appears to be the common order of things. Neither are the contests worked out on Marquis of Queensberry rules, the chief ambition of every gentleman hare in March being to kick every other gentleman hare into insensibility. The one who can jump highest and kick hardest wins the fair lady, and it is a laughable sight to see two hares indulging in one of these sky-hopping contests. Taking a run at each other, they collide in mid-air, striking furiously, each trying to kick the other over the wall and into the next field. I have seen two hares, startled by a common foe, make off side by side, and simultaneously take one of these running jumps at each other ere going fifty yards, to come to earth and repeat the performance time and again till finally out of sight. Also, a male hare, on seeing a rival, will stand straight up on his hind-legs, appearing of enormous size, and utter such a scream of rage that the other hare will bolt rather than remain to fight this veritable elephant among hares!

BREEDING.

The Mad Moon lasts generally into the second week of April,* and at about this time the first leverets of the season come into the world. Hares continue to breed till September, and at least three litters are produced annually. Curiously enough,

* In Scotland and in the Pennines hares may be seen in pairs, or even in groups, during the dusk of the evening, till well on in the month of May, or even later in very high country. Much depends on the weather conditions.—H. M. B.

the young are born with their eyes open, though they remain in the form till about a fortnight old. Gestation takes approximately four weeks, and two or three at a birth is the usual number. During the periods of abnormal increase in their numbers, to which subsequent reference is made, five or even six may be born, but the number always returns to the original two or three. The young are mature at one year, and the first two years of a hare's life are the most critical. If it survives these, it is well on the way to becoming a wise hare, which is the only hare that lives till the decline of its powers heralds its going.

As soon as the young are old enough to leave the nest they are able to dispense with the services of their mother. Each day thereafter they become more and more independent of her, living their lives apart. By this time she has probably formed new associations, and is well on the way to the production of another family. It is seldom that the young are seen following the mother, except, perhaps, during abnormally dry seasons, when water becomes necessary to their existence; then, occasionally, the young may be seen accompanying the dam down to the drinking-place. She will, however, fight on their behalf till she becomes occupied with a second brood, and the squeal of one of her leverets brings her instantly to the place, prepared to do battle with cat or stoat as the occasion may demand.

In passing to and from the form in which her young are hidden, a mother-hare exercises the utmost care to break the line of tell-tale scent she leaves. This she does by back-tracking a certain distance, so as to leave a dead end in her trail;

then she takes a terrific leap to one side or the other, and repeats the performance. I knew one hare whose leverets were hidden at the edge of a swamp, and in coming and going she always threaded a tortuous course through this swamp, jumping and back-tracking many times, and seeking out the wettest patches, where the scent would not lie.

I have heard of a hare leaping on to a hedgerow, then off again at a tangent, in order to break the line; and I have watched one leap into a swamp that lay out of its direct pathway when going down to its feeding-grounds—the diversion being made, apparently, for the sole purpose of breaking the line.

INTELLIGENCE.

Just where does the hare stand in the scale of animal intelligence? Higher than the rabbit, yet a long way below the deer and the otter. It has not even advanced to the first stage of civilisation by keeping its home clean and sanitary, and in this may lie the secret of the fearful epidemics which occasionally devastate the whole hare population of certain areas.

But the hare profits by previous experience, and in this lies the beginning of wisdom. A mother-rabbit blunders into the same mistakes season by season, and her young are taken from her by the same harsh fate; but a hare seldom blunders twice into the same mistake. ‘Once bitten, twice shy,’ is the axiom of her existence. The whole trouble lies in the fact that the young do not profit by the experience of their elders. Each has its own way to make and its own experience to gain. Were this not so, the hare would

assuredly be among the fittest of the land, for to its natural gifts would be added the ability to adapt itself to changed conditions, and thus to become modernised, as have the deer, the otter, and the fox.

DISEASES.

But it is as well the knowledge gained by experience is not transmitted, or nature would fall back upon disease to make up what was lost by the baffling of the hare's foes. In this country the hare population is reasonably free from disease, owing to the fact that they are never over-plentiful; but in other countries the number of hares periodically becomes so enormous that they literally overrun the land. In certain parts of Canada, for instance, hare plagues occur regularly. In two or three seasons their numbers increase from a moderate sprinkling to tens of hundreds per square mile. It becomes impossible for man to cope with their numbers, for thousands may be killed without making any appreciable difference. One can stand in a clearing of the forest and count literally dozens of hares without moving one's standpoint. Seton estimates their numbers at such times as five thousand to the square mile, allowing one mile in two as not suited to the hare's tastes, and, therefore, being unoccupied by them, which means ten thousand to the square mile of suitable grazing.

Such plagues do not last long—a few months at the most sees them through; for disease, every disease under the sun, soon becomes rife, and in a season or two not a hare is left. It takes not only the weak, but also the strong; it clears the whole

country of its hare population, and the dead bodies of the victims are littered like leaves over hundreds of miles of territory.

HABITS IN SNOW.

The 'long valley' hare, like the rabbit, is subject to fits of torpor during periods of deep snow and cold. Seeking out its form, it allows itself to become snowed in, and there remains, perhaps, for several days in a more or less torpid condition. This is about the wisest thing it could do under the circumstances, for a hare in deep snow is deprived of its only weapon of self-defence—its speed—and is, therefore, at the mercy of its foes—man included. Its enemies, moreover, realise its helplessness at such times, and are quick to profit by the fact. One cannot imagine a kestrel being guilty of attacking a hare in normal times, but this small hawk will readily do so when the hare is at a disadvantage in the snow. One snowy morning I was walking down a hedge-row in Northamptonshire, when I heard a hare screaming in a thicket ahead. Going up to the place and beating the hedge, I was surprised to see a hare make off from one side and a small kestrel from the other. Evidently the hawk had attacked the hare out in the open, but, unable to hold it, had been dragged into the hedge.

I once shot a merlin which was seated, as I thought, on the snow. Going up to it, I found that the little bird had just killed a white mountain-hare, which was several times larger than itself.

Thus the hare's possible enemies in normal times become probable enemies in snow times, and wise

is the hare that during such season hides deep under the drifts.

SWIMMING.

Few people, perhaps, have seen a hare deliberately take to the water, for this animal is no more partial to such an element than is the cat; yet a hare, hard pressed, will enter water and swim for its life as readily as any other creature.

When fishing in the Galloway highlands, a friend and I noticed a hare browsing on a point of land jutting far out into the loch, so we promptly cut off the only possible land retreat and began to approach the animal. Speculation was rife as to whether it would take to the water, or whether it would try to dodge between us, which it could easily have done without passing dangerously near. Finding itself in difficulties, the hare ran backwards and forwards once or twice in search of a dry way of escape, but discovering itself marooned, it jumped unhesitatingly into the loch, and struck out manfully for the nearest point, fully ninety yards away. Its action in the water was truly ludicrous, for it swam in a series of bounds, propelled evidently by the hind-legs. At first each stroke raised it head and shoulders out of the water; then it would sink back till almost totally submerged; but as the distance increased the strokes became feebler and more erratic, till we feared the poor beast would drown. It just succeeded in getting across, however, but had the water been really cold it would probably have perished.

I have at other times seen hares swim short distances, but from the exhibition just described,



THE BLUE HARE—'WHERE NONE DARE FOLLOW.'

W.A.

N

I should put this animal down as a very feeble swimmer.

SECRET OF SURVIVAL.

Wherein lies the secret of the hare's survival? In its fecundity, and there alone. It survives simply because it is better able to stand the huge drainage on its numbers than the creatures that once shared its environment, but are now gone. In some districts its numbers have dwindled to the merest few, and were it nowhere preserved its extermination would be a matter of ten years at the most. Over vast areas of country the hares are totally exterminated by the end of winter; but during spring and summer, when the warfare against them abates a little, other hares creep in from the sanctuaries farther afield, and make good the shortage. Our old English and Scottish estates are responsible for keeping the hare alive; and were they to go, the hare would most assuredly go with them, and we should lose a creature that is not only inoffensive to man, but is a joy to behold—truly a child of the wild March winds and of the great open places.

SPECIES.

Ireland rejoices in a species of hare—among other things—quite its own. The Irish hare has been introduced to Great Britain, and the British hare to Ireland.

LENGTH OF LIFE.

I have no notes on the length of life of captive hares, but there is no doubt that if both were in captivity the hare would in all probability outlive the rabbit by two or three years. In the wild this

does not apply, for, whereas a wild rabbit may live to become old and decrepit, a hare never does. As soon as its senses begin to lose their keenness, it inevitably falls a victim to one or other of its foes. A rabbit can seek the shelter of mother-earth, and becoming conscious of its enfeebled state, it ceases to wander far afield, remaining always near to some place of sanctuary. Not so the hare. When old age comes upon him, he must still sally forth into the open, meeting his foes on their own ground; and the day of his first and last failure inevitably dawns with the falling off of his powers.

The average hare is well past its prime at nine; it is old at ten; and few, if any, live to see twelve.

WEIGHT.

The mean weight of the brown hare is between 7 and 9 lb. A 9-lb. hare is a good one; and 11-lb. hares are occasionally heard of, though seldom bagged.

THE BLUE OR MOUNTAIN HARE.

Known also as the Snow-Hare, the White Hare,
the Varying Hare, &c.

THOUGH indigenous only to the Highlands of Scotland, this distinct species has been introduced to most parts of the Scottish Lowlands, where it now flourishes exceedingly, also to Wales, Northumberland, Yorkshire, Cheshire, and other English counties. In Scotland generally it is on the increase, and in some parts its progress is marked by a proportionate decrease in the number of brown hares—probably a matter of cycle in both cases.

Both in character and in appearance the blue hare is more nearly related to the wild rabbit than is the brown. Whence came its name it is difficult to ascertain, for it is not blue. The species is most easily distinguished from the brown hare by its ears, which are proportionately shorter and smaller, while the black tips are less distinct; the ears of the blue hare are, indeed, very much like those of the rabbit. Its limbs are shorter, more compact, and designed less for speed. Its head is more stubby and rounder, and its tail consists of a white ball of wool, like that of the rabbit. It is considerably smaller than its congener, and its coat is softer in texture, more woolly, and shorter; while the species is without the strong, cat-like whiskers of the brown hare. The undercoat is seal-blue, the hair being tipped with rabbit-brown, and in parts touched with the russet shades of the common hare, so that when the coat becomes worn a distinct bluish cast predominates, rare individuals

being quite blue. Normally the blue hare is no more blue than is the brown rabbit.

In December the blue hare begins to 'turn white,' in order 'to match the snow.' As a matter of fact, the 'turning' process is effected by a moult, as in the case of its near relative, the snowshoe rabbit of North America; and so far as the animal matching its winter surroundings goes, it would probably be better off if it remained brown. The change is not always complete. A certain amount of colour-pigment generally remains down the spine, and the ears always retain their black tips by way of a striking contrast. This fact would seem to support the theory that animals that are essentially creatures of the chase are coloured so as to attract, rather than evade, detection when they rise in flight. By the end of December most of the hares are in full winter coat, which they carry till March, when they quickly reassume their spring-time garb.

DISPOSITION.

The blue hare is a less cautious and a less wary animal than the brown. When disturbed it does not run right away, but generally sits up and looks curiously round after running a few paces, and this it repeats several times ere finally passing out of sight. I have known one to come limping unconcernedly up to the butts where the guns were in full blast, and to regard the sportsmen with cool inquiry! Often these hares are a great nuisance on the moors, as their stupidity is apt to distract the attention of the dogs.

Though a comparatively solitary creature, the blue hare is nevertheless more gregarious than the brown. Sometimes, during a severe winter,

the animals will migrate from one range to another, or from the heights to the more sheltered levels, and at such times quite a string of them may be seen moving in company, apparently enjoying each other's society by jumping and skipping together.

If the white coat of the blue hare were intended for protective purposes, it has been left by the tides of time. True that during the winter months the hills of this creature's habitat are generally white; but if there is a black spot anywhere, such as under the shelter of an overhanging rock, any white hare in the vicinity is sure to go and sit on it, vastly conspicuous from afar. Also, the hares naturally seek out any patch on the hill-side that is wind-swept of snow, so that when protection is most needed—namely, when they are at their feeding-grounds, or when basking in the daylight—they are more likely to be rendered conspicuous by their 'protective colouring' than they are to derive protection from it, especially when it is borne in mind that the eagle figures as among the most deadly of the mountain hare's foes.

RANGE.

Normally the blue hare and the brown do not interbreed, though their ranges considerably overlap. I have known brown hares to live the season through at an altitude of sixteen hundred feet, coming down to feed during the winter months in the valley-levels, but immediately returning to the heights when disturbed. Two thousand feet is probably the topmost altitude of the brown hare's range, except during hot summer months, when it may mount to an altitude of two thousand five

hundred feet. Above that the territory is sacred to the blue.

Blue hares, on the other hand, observe no fixed rule as to boundary. The heights are theirs undividedly, but they are quite at home in the valleys. Occasionally a very severe winter will drive all the blue hares from the heights into the sheltered lowlands, where they remain at river-level intermingling with the brown. Particularly does this occur along the Scottish coast, and it may be well into spring ere the last of the mountain residents find their way back into the mountains. In such cases interbreeding often occurs, but the offspring of such unions are evidently pukka hybrids, for, so far as I know, no intermediate strain has ever been established.

The blue hare is not very much valued by sportsmen. Existing as it does in the realms of nobler game, it is generally regarded as vermin. Systematic hare-drives are regularly organised in the hills in order to keep the number of blue hares within reasonable limits, and in some parts of the Highlands it is no uncommon thing for as many as a thousand hares to fall to six or seven guns during a day's drive. For the table the blue hare is regarded as inferior to the brown, but the quality of its flesh is entirely dependent on the nature of its food. A hare that has lived on heather and similar mountain vegetation is not good to eat, but one that has fed in the valleys is as good as any other hare. The snowshoe rabbit of the Canadian woods is quite unfit for human consumption during the winter months, when the animals live exclusively on the tough evergreens and the bark of sapless trees; but a spring-fed snowshoe is excellent eating.

The snow-hare has larger feet than the 'long valley' hare, to enable it the better to skim the drifts, and, needless to add, it is a much harder and more violent animal.

BREEDING.

Whereas the brown hare produces on an average three litters per year, the season for the mountain-hare is shorter, and it seldom, if ever, produces more than two litters annually. What it loses in this way, however, it makes up in the number of young per litter. A brown hare may breed three times during the year and produce a total of seven young; a blue hare may breed twice and produce eight. For, whereas two or three kits per litter is the normal number of the brown hare's brood, four or five regularly occur with the blue.

A brown hare may, certainly, have as many as eight kits per litter, but in that case she breeds at the most only twice, possibly only once, in the season. A blue hare may similarly have eight or nine to the litter; but even if the number mount to ten, she is still fairly sure to produce her two litters. Thus, not only on account of its hardy disposition and the seclusion of the regions it inhabits, but also on account of its fecundity, the blue hare is better able to hold its own than is the brown; and with the increasing rarity of eagles and buzzards the reduction of its numbers is almost undividedly in the hands of man.

The mating activities of the blue hare occur almost entirely by night. Very little seems to be known as concerns this chapter of the animal's existence. There is no particular reason to suppose, however, that its mating customs differ widely from those of the brown. That the same old fights

occur between the rival bucks is indicated by the tufts of hair that cling in patches to the ling-tips during the Love Moon, and the creatures are, of course, polygamous.

FOOD.

The strong teeth of the blue hare enable it to eat almost any vegetable matter that comes its way. It is less of a dainty feeder than is the brown. I have known it to eat, or at any rate to tear asunder, the cones of coniferous trees, probably to obtain the seed, leaving the earth littered with husks, as does the common squirrel.

GENERAL CHARACTERISTICS.

The blue hare is nothing like so speedy, nor is it so resolute in flight, as is the brown. A good sheep-dog can run it down—often without any great resistance on the part of the hare.

It is seldom indeed that a brown hare takes to earth, whereas a blue hare will den up readily if hard pressed—seeking safety in a cranny among the rocks or in a disused rabbit-burrow. A Perthshire keeper showed me several short burrows or seats scratched in the peat, so shallow that one could in every case reach the end with a walking-stick. The keeper himself was most emphatic in his belief that these shafts were engineered by the hares as emergency tunnels, chiefly for shelter from birds of prey, and he assured me that the hares regularly used them as breeding-nests; but this I very much doubt. There seemed to be a lack of evidence to prove that the burrows were not the work of rabbits, taken possession of by the hares, though the keeper had probably more grounds for his beliefs than there were for my scepticism.

Information bearing on this point would lead to a more complete understanding of the blue hare's habits.

WEIGHT.

The weight of the blue hare is generally between 5 and 6 lb. Where food and conditions are favourable, it attains a weight not exceeding 8 lb. Its average length from the nose to the tip of the tail is 21 inches, as compared with 23 inches in the brown.

THE RABBIT.

AS a rule, young rabbits are born in a shallow burrow known as the 'stop' or the 'stab,' often not more than a yard in depth, and so small that one would hardly think an adult rabbit could squeeze into it. Generally this hole is out in the centre of an open field, facing south for warmth. It is the rabbit's first step towards hiding her young, though her ideas in this direction are still so undeveloped that she often digs her stop within view of the whole colony, the fierce old bucks of which are as great a source of danger to her children as is the weasel or the stoat. The nest consists largely of down the mother has stripped from her own breast, intermingled with soft dry grass or moss scratched from the rocks, so that nothing warmer and softer could be imagined. While the young are still blind and helpless, the mother sometimes, but not always, covers the mouth of the hole, on leaving it, with sand and loose bedding, treading down the covering so that it resembles the features of the surrounding earth.*

Nature devotes a good deal of energy, however, to keeping the rabbit population within reasonable limits, and it is just as well that it is so; otherwise Bunny would overrun the whole universe. Often this thinning-out process begins before the babes have seen the light of day. Perhaps the mother is young and inexperienced in nest-making, and instead of digging the burrow half-

* This occurs only in the case of a 'stop;' when the young are born in a common burrow, the mother never attempts to close the entrance.—H. M. B.

way up the sloping bank, she digs it at the bottom, and the day after her infants are born there occurs a heavy thunder-storm. Water collects in the little hollow, and begins to trickle into the burrow. It may finally fill the chamber within, drowning the whole family; or it may merely damp the bedding. In the latter case three of the young ones, perhaps, contract paralysis, a fourth dies, while the remaining two, being sturdier than the rest, take no harm. When the mother comes again to feed them, she rakes out the dead one, and evidently carries it off so as not to advertise the whereabouts of her home, for I have never seen the missing member of the family lying near the nest. Yesterday there were six in the hole; to-day there are only five. The weakly one is gone, but there is no sign to indicate where.

In a few days all the young have their eyes open, and are old enough to begin to think about a vegetable diet. The first favourable night, therefore, the mother leads them out of the nursery-burrow into the moonlight, shepherding them and pushing them along, while, dazzled and bewildered, they try to get beneath her. Slow is the progress that they make; but presently, topping a ridge, they see scores of other rabbits squatting about on the moonlit plateau, some quietly feeding, and others sit up with ears erect, doing sentry-go.

The mother-rabbit now becomes very goggle-eyed and important, stamping her hind-legs as she herds the sprawling little ones across the open. Several rabbits sit up and look at her; then, seeming to take it as a matter of course, go on with their feeding. One long-legged old gentleman (more like a hare than a rabbit), through whose ears there are many shot-holes, hops up with a

look of inquiry, circles inquisitively round once or twice, then scratches his neck with an air of indifference. His very manner seems to indicate that this old fighting buck is the king of the colony, and that one will hear more about him later on.

The mother-rabbit takes her family to the home-warren, whither most young rabbits go as soon as their nest-days are over, and here their worldly training begins. By no means are they the only young rabbits occupying the burrow, for on sunny days scores of the same age are to be seen sitting about the warren-entrances, enjoying the warmth, or shivering in the wind, between intervals of nibbling the closely cropped grass.

As the days pass they find more and more of their own food, thus becoming less and less dependent on their mother; and she, sad to relate, is very rapidly losing interest in them. Old Long-Legs, the king of the colony, now begins to make himself felt. When he has nothing else to do, or the time seems favourable—whenever, indeed, he happens to think of it—he amuses himself by chasing the youngsters through the burrows, kicking them and nipping them, and making himself an unholy terror in their lives. At first their mother sticks up for them in a half-hearted way, for they are still quite small. But soon she seems actually to forget which are her children among the many that throng the burrows; and so Long-Legs bites their ears, kicks them head over heels, chases them, and makes them squeal for mercy, till finally they run and hide at the sight of him.

NIGHT FEEDING.

Each night the young rabbits venture a little farther afield, becoming more and more interested

in the movements of their elders. At dusk an old doe sits up and begins to hop out along one of the clearly defined runways that lead from the burrows. Slowly and cautiously she goes, placing her feet just where she placed them last night and the night before, while behind her comes first one rabbit, and then another. A second old doe (a buck never leads) sets out along a second runway, leading in the opposite direction; then the move becomes a general one, almost every adult rabbit sallying forth on its nightly foray. For a minute or two the whole earth is brown with them, and one would never believe a single warren could contain so many residents. Rapidly, almost mysteriously, they melt away. In the dimness you just see a leading doe, perched like a silhouette on the break in the wall, as she pauses for a final survey ere she leads her train into the next field. She disappears, and a second black speck takes her place; then a third and a fourth are seen, like bobbing clockwork toys; till finally the gathering darkness blurs out the gap.

Not long do the rabbits stick to their runways, one branching off here and another there, so that by the time the moon is up they are scattered all over the country-side—old Long-Legs being two miles away, nibbling a cottager's cabbages at the very threshold of the village. At the home-burrow, squatting about the plateau, there remain only a sprinkling of youngsters, and a few nursing mothers keeping guard.

The youngsters join in at the tail-end of the procession ere very long. The first night out, the wall across the meadow appears to them as an insurmountable obstacle, so they nibble the grass on this side of it; the night following they try

the leap, and succeed, browsing on the other side; ere a week is up they are nibbling the grass nearly a mile away—keeping a weather-eye open for Long-Legs, who is apt to pounce furiously upon them at any time.

All along nature's weeding-out process, designed to keep their numbers in check, is going on. There comes a rainy spell, during which several of the young rabbits contract liver complaints through eating too much wet grass, and die. In the wood near there lives a wild-cat of the tame variety. She actually shares a room under a rock with several adult rabbits, and each night she steals forth along a rabbit-runway, as though she were one of the colony; yet ten minutes later she is crouching behind a wall, a sinister vision of bristling fur and gleaming eyes, waiting for the first unwary youngster that comes her way!

Then one night a whole battalion that set off northwards fails to return; and at dawn, before the respectable world is astir, a ramshackle motor-car takes a sackload of netted rabbits to a neighbouring station.

In spite of these drainages, however, the home-warren becomes more and more thickly stocked, every mother taking her young there as soon as they are old enough. And now we see the value of old Long-Legs, who in the past has been a bully and a tyrant, apparently neither useful nor ornamental. The family whose career we have so far followed are now strong and independent; but Long-Legs is still the terror of their lives, driving them out whenever he sees them, as if intent on inflicting some bodily injury. Glad to be rid of him, they turn at length to the great

wood at the mountain-foot to the west, and here, among the loose rocks, thickly overgrown with bracken and briar, they make homes for themselves, free to do what they choose.

THE OVERFLOW FOREST.

This wood is really the overflow reservoir for the home-burrow. Each year scores of young rabbits have been taken to the burrow, remaining there till old enough to take care of themselves; and then, bullied and harried by some old buck, they have gladly moved to the shelter of the wood, which, as the season proceeds, becomes thronged with the surplus stock of young rabbits. Were it not for this the home-burrow would become overcrowded, and disease, nature's never-failing remedy, would fall upon the colony.

COMMUNICATION.

Almost all animals of gregarious habits have ways of signalling danger to one another. The beaver, when alarmed, strikes the water with its tail as it dives; and this system of signalling is of value in that it conveys the warning to the members of the colony who are under water, preventing them from rising hap-hazard, while at the same time the loud report is heard by the beavers on land, admonishing them to be on the *qui vive*. The rabbit thumps the ground with his hind-legs when danger threatens, and, just like the 'smack' system employed by the beaver, this notice conveys the tidings to those below in addition to those feeding on the earth's surface.

One of the first things young rabbits learn to do is to signal danger by thumping the ground with their strong hind-legs, and it is to be feared

that in their inexperience and ignorance they misuse the alarm when they are small, thumping away at the very slightest pretext, and apparently carrying on a Morse system of telegraphy with each other in this way. Little Bill, nibbling the grass, sees a beetle fall off a twig, and at once thumps; Janie, down below, thumps in answer; then everybody else thumps, because it is the fashionable thing to do, and the very earth shakes. Having thus scared themselves, they all keep quiet for a second or two, then forget all about it till another false alarm is given.

Old rabbits, however, never thump unless they suspect serious danger, and the more suspicious they are the more vigorously they thump, the system being of endless value in their constant watchfulness for their foes. One night, for example, when most of the rabbits are away at their distant feeding-grounds, the few that remain at home at the warren—namely, the very young and the nursing mothers—hear the alarm afar off, and at once are on their guard, drawing near the mouths of the holes so that they can instantly pop underground. The alarm was possibly given by a rabbit three fields away, thumping as he ran, and on the still night the sound carries far and wide, warning the entire rabbit population of the district that danger is abroad. Similarly, one rabbit above ground sees danger approach the warren, and giving the alarm-signal as he pops down, he warns all the rest against emerging, which otherwise they might easily do, to meet danger at their very threshold.

Then rabbits have another and a far more important way of signalling danger to each other, which they do unintentionally and without sound.



WILD RABBITS—'THE COLONY OF THE HUNTED.'

W.A.

There are times when the thump system would merely attract the attention of their foes—when it is better that every rabbit should steal swiftly away, as silently as possible, as they often do.

Of what value is the rabbit's white tail? One would think it merely makes him conspicuous when otherwise he might escape unseen; and this, indeed, is the case. His white tail is of no value to him personally—in fact, he would be better without it; but it is endlessly valuable to his friends, in the same way as *their* white tails are endlessly valuable to *him*.

The whole colony is at its feeding-grounds, and suddenly danger appears over the ridge. The rabbits are as yet unseen, but the faintest sound would betray their presence; so the cony nearest the danger rises and bolts swiftly and silently, and every rabbit he passes sees a bobbing white danger-signal, which means there is not a moment to be lost. And each rabbit, as he beholds it, rises and glides away, unintentionally giving the alarm to those nearest to him, so that in a few seconds it has spread north and south and down the forest-side, and the man stealing through the shadows with his gun wonders why there is not a rabbit abroad to-night, for by the time he reaches the foot of the wood the alarm has flashed ahead of him over two or three fields!

Many a time, in the dusk of evening, I have peered down into a ravine I knew to be literally full of rabbits, but not one of them could I see until, on my loosening a pebble, the whole green-sward below has instantly become dotted with bobbing white danger-signals, nothing else being visible. For the rabbit does not exhibit his white tail when feeding ordinarily; it is only when he

risers and runs that it shows up vastly visible, and he can run at full speed through the densest of undergrowth without displacing a leaf.

On their runways, rabbits always place their feet in exactly the same places, so that the track, instead of being evenly worn, like a human pathway, consists of a string of worn patches, from one to the other of which they hop. The rabbit-catcher knows this, and places his snare in such a way that it will catch the rabbit mid-leap; but a pathway of this kind is of value in that the patches become trodden hard and free of crackling leaves and twigs, so that the owners can run along it without creating undue noise.

ENEMIES.

Rabbits appear to exist simply as a natural food for other things—another reason, perhaps, for the aforesaid white tail—and there is no end to their foes. Guns, nets, snares, traps, dogs, weasels, cats, and foxes are but a few of their everyday enemies, for tens of thousands of rabbits meet their fate annually by flood-water or by disease. Those killed by man, the veritable cart-loads which go to our cities each week during autumn and winter—in fact, the whole year round—are but a dribble compared with the gigantic drain on their numbers effected by the ordinary course of nature; yet everywhere the rabbit thrives and multiplies, often to so great an extent that the most stringent measures have to be taken in order to keep its numbers in check.

In the mountains of the north the rabbits, for ages past, have made their burrows in the sandy banks of the mountain-burns; and the very fact that these banks are of sandy formation, which

so exactly suits the rabbit's burrowing habits, proves that the streams are subject to sudden torrent from the heights, the silting and sifting process of endless floods having washed away the earth and left only the insoluble sand. Each year, when these burrows are full of young rabbits, the flood-waters come down and exterminate whole colonies—the victims merely huddling in batches at the ends of their holes, making no attempt to escape ere their retreat is cut off. In fact, the abundance or scarcity of rabbits in the autumn in these regions is governed entirely by the number of spring and early summer spates. If there have been no floods, then August finds the glens and the woods alive with rabbits; but if, on the other hand, floods have been frequent, there is hardly a rabbit to be found in the country when August comes along. I have walked in May down a glen, and seen more rabbits in five minutes than one could count. Then have followed days of thunder and heavy torrent on the heights, the mountain-burn rising from a mere laughing brooklet to a roaring cataract, bearing whole trees on its troubled waters; and when, a month later, I have walked down that glen, scarcely a rabbit have I seen. The receding waters draw hundreds of the dead bodies from the burrows, bearing them away to the sea.

It is just as well that nature should impose these immense drainages. We have rid the land of many of the rabbit's natural foes—the wolf, the eagle, and so on—while foxes and weasels are everywhere kept in check, so that, if nature did not inflict these wholesale losses upon the rabbit's numbers, man would be hard put to it to keep them down.

House-rats, indirectly, are among the rabbit's

worst foes. When a rat becomes diseased he is driven out by his fellows, and forced to make his home far from them. Probably he resorts to rabbit-burrows, and rabbits, being very subject to disease of any kind, rapidly pick up the rat's ailment, which spreads from one to another throughout the whole colony—perhaps throughout the whole country-side. Most of the rabbit's fatal diseases are conveyed to him through the loathsome house-rat, and ferreters regularly discover diseased rabbits and a diseased rat occupying the same water-side burrow.

BLIND RABBITS.

Of all ways man employs of taking rabbits, probably more fall by the snare than in any other way, for its use is world-wide and universal. Every village has its rabbit-catcher; perhaps he is an old man, who goes dothering round to look to his snares long after he is too old for any active form of hunting, and great is his fund of knowledge for the select few who come to know him.

Netting is the only humane way of catching rabbits, as, in shooting, a certain percentage get away, however deadly a shot one may be, to perish miserably; while in ferreting, numbers of rabbits are injured by the ferret—if not by his teeth, then by his claws—and have to be abandoned in their burrows. I consider snaring more humane than ferreting; but the cruelty begins when old and rotten snares are used, and the rabbit gets away with the tightly drawn noose about his neck.

What fate is then in store for him? Better far that he had met the weasel on his own ground, or perished by the flood-waters when he was small. There is no getting rid of this hateful thing about

his neck, and he does not know what ails him. For days the wretched creature lingers between some sheltering cranny and a patch of green-sward, wearily dragging himself back and forth, unable to eat or to take an active part in the world of sunlight about; and in the end blindness overcomes him, if not death in some merciful form.

Sometimes, after days of torture, a rabbit gets rid of the cruel noose, and finally recovers his strength; but he is now a blind rabbit. Every colony of any size has its blind rabbits, just as long ago every herd of buffaloes on the prairie had its blind members. And just as the blind buffalo, his other senses becoming quickened, was often the first to give warning of danger to the rest of the herd, so blind rabbits, feeding with the rest of the colony, are frequently more alert and keen than any of their brothers and sisters.

I have seen a rabbit, totally blinded by the broken snare or by shot, get up and bolt like an arrow on the first approach of danger, dipping underground at the exact spot without hesitation or fault. His foes are many, however, and, thus greatly handicapped, it is merely a matter of time ere he falls to one or other of them. Once off his own runway, once turned aside from the path he knows so well, and he stumbles, falls, and is lost, finally crouching in the open without further attempt to save himself.

The rabbit is swifter than the hare when on its own ground and over a short distance, the superiority of the hare lying in its staying-powers and in its marvellous maintenance of a high average speed.

It is generally thought that the natural home of the rabbit is its burrow, that this creature belongs to the earth, and comes up only for food; but this

is not so. Like most wild creatures, rabbits love the sunlight and the air as much as we do, and seek the ground only as a place of sanctuary from their foes or from storms. A far greater number of rabbits live and have their homes above ground than dwell in burrows, their open-air houses consisting of little seats in the grass, wisely chosen to suit the weather; and here they crouch as you pass by, never stirring unless you threaten actually to tread on them.

In an alder-grove near to my house an old rabbit had his home for a long time, seeking safety in the midst of the village, and never associating with any of his kind. He dined on the fat of the land—namely, the produce of the village gardens; and though many a hairbreadth escape did he have, for long he evaded his foes. I fancy he knew every dog in the village, and how he could fool each one of them. The big sheep-dogs he could get rid of merely by running under a certain gate, which was filled in with wire-netting, and the pursuing dog, after ramming its face in the netting and probably making its nose bleed, had lost so much time that the cony was well able to get out of sight and gain the shelter of a tiny bridge under the burn, where no dog could reach him.

There was one dog, smaller and cleverer than the rest, that many times all but brought about this rabbit's destruction. This was a fox-terrier belonging to the rectory, and on seeing the cony head for the gate he would at once dart through a sheep-hole in the wall, and be ready to meet him on the other side. But eventually the rabbit hit upon the notion of diving under my summer-house, where even the terrier could not follow, and that world-wise little dog used to spend his Sundays,

when the family was at church, undermining the summer-house—quite oblivious of the fact that the cony had long ago escaped from the other side, and was now safely under the bridge.

There followed a very severe winter, and the rabbit, hard pressed for food, took to gnawing the bark from the garden trees, spoiling numbers of them, so that a price was placed upon his head. I could have shot him any day, but had not the heart to do so, since he had thrown himself on my charity, and regarded me entirely as a friend. So I saw to it that all household refuse suitable for rabbit consumption was placed near the door at his disposal, and for weeks the cony fed at the kitchen door, thriving and keeping fit during that terrible spell of snow and frost.

This rabbit had no burrow, but in the alder-grove he had many seats. It was a walled-off patch of land, overgrown with coarse grass—a tiny corner which belonged, I believe, to the church, but in which no one seemed to be interested. Here my little friend had fine-weather seats and wet-weather seats, hot-weather seats and cold-weather seats. Some were open and faced south, so as to catch all the sun; others were mere shady summer-houses facing east; while still others were deep down in the grass, secure from wet and wind.

In the end this rabbit met a sad fate. Frightened by village children one stormy April evening, he sought his old sanctuary under the bridge, and a few minutes later the burn began rapidly to rise. The rabbit evidently stuck it till he was flooded out; then, forced to swim, he took to the water. As bad luck would have it, the two sheep-dogs, which he had fooled a hundred times, were just at that moment crossing the bridge as they brought

down the cows to be milked. One of them saw the cony as he battled gamely with the current, and his mate having been given the hint, the two dogs took up their respective stations on opposite sides of the burn.

Many times the rabbit tried to land, but always a dog was waiting to snap him up. Well, he had fooled them before, and he would fool them again ! This was the end, perhaps, but he would choose his own closing chapter !

We saw him fighting gamely down the centre of the stream, now disappearing bodily under the surface, then struggling up again and sweeping on with the current. The cow-boy and half-a-dozen other youths had joined the dogs, pointing and encouraging, throwing stones, sticks, anything they could lay hands on, at the little fugitive, as though he had not already difficulties enough to contend with.

Did he try to land again ? Ah no !—not to be crumpled and crushed without a fight here on his own land, where a hundred times he had beaten them—singly or together—by his own fleetness and quickness of wit. Fifty yards away the burn joined the river, now bank-full with dark, racing waters that crashed and roared among the rocks.

When last I saw my little friend he was drifting rapidly—no longer struggling with a current far too strong for him, but borne this way and that like a straw in the rapids. I saw him reach the point where the burn joins the river, and there, with a mighty swish, he was gone !

A group of boys and two dripping dogs stood like statues and stared across the troubled waters, tinted now with the crimson and gold of evening as they swept on their course through the quiet

valley. Away off were the yapping of a sheep-dog and the soft low of cattle, while overhead the jackdaws and the rooks sailed clamorously home to roost.

For nearly a year he had lived at my threshold, but now I had seen him for the last time—leaving his pursuers far behind, as so often before, but heading at last into that wonderland of gold and crimson whither our vision could not follow.

METHODS OF CATCHING.

Rabbits are valuable for food, and, moreover, it is necessary for man to take a heavy toll of their numbers owing to the damage they do to the land. It is doubtful whether they can be raised profitably on grazing-land at the customary market-price, as not only do they keep the grass closely cropped, but also they kill a good deal of it, while a sheep will not eat where a rabbit has been. All these things being so, it may be as well to describe one or two of the methods employed by rabbit-catchers in their necessary work of keeping the rabbit population within reasonable limits.

One of the best rabbit-traps I know, and certainly the most humane, is the box-trap. This is usually set in the surrounding wall of a wood well peopled with rabbits. The rabbits leave the wood every evening on their way to their feeding-grounds, passing through holes in the wall wherever there is a convenient runway for them. Let us first describe the trap, when its manner of working will become obvious.

Its first essential feature is a wooden tunnel or runway which is built into the wall. This runway is provided with a false floor, which can be locked, but which, when unlocked, immediately swings

downwards when a rabbit places its weight upon it, returning to its natural position immediately the weight is removed. Directly below this false floor is the wooden box into which the deceived rabbit falls, to remain a prisoner till the owner of the trap comes along to empty the box. The whole thing must be made to work freely and silently, even though thoroughly saturated by rain.

This device is best set in position in the spring, being placed in a locality which rabbits always frequent. All spring the false floor is left locked, so that the young rabbits become accustomed to using the trap as a natural runway, care having been taken to stop up the other gaps in the wall above and below the box. By August, if all goes well, numbers of rabbits will be passing nightly over the false floor, regarding the tunnel as their own property, and at any time the owner of the trap likes he can release the false floor, and he is pretty sure of a haul.

The advantage of this trap is that, when once made, it lasts for years, providing good waterproofed wood be used ; but it must be *well* made, any noise or hitch in its working being likely to detract from its value.

NETTING.

I have had many an exciting night netting rabbits at the tail-end of the season, though for this one must know one's ground pretty well, and the runways of the rabbits that frequent it. Also a clever dog, trained to the work, is more or less necessary.

One waits till fall of darkness, by which time the rabbits have left the wood and are well away at their feeding-grounds ; then, very quietly, one

steals into the wood, selecting as the position for the nets a gap in the wall or an open gate which the rabbits are known to use on returning from their nightly wanderings. Silently then the nets are fixed out in the open opposite the gap, two of them being used, placed vertically, running parallel about eight inches apart. The net which the rabbits will first encounter is of fine mesh—too fine for a rabbit to escape through; but the other, erected behind it, is of very large mesh—so large that if used singly the rabbits could run straight through it almost unhindered. The idea is that the rabbits bolt into the first net, and, such is the force of their rush, they pass through the meshes of the second net also, carrying with them the portion of the first net in which they are enveloped. They thus become drawn up in a bag, as it were, and are quite unable to escape, even though left for some minutes. If a single net is used, many of the rabbits, encountering it, at once turn back and probably escape; so that the man in charge of the net must catch each rabbit as it comes. In so doing he turns more than half the rabbits aside, and thus spoils his chances of a good catch. Hence the advantage of the double net.

As soon as the nets are fixed, the men working them hide behind the wall in readiness; they then give the word to the dog, who has been waiting in shivering excitement for this part of the performance. The dog, knowing his work well, quietly circles round to the far side of the rabbits, where he begins to show himself, slowly quartering the ground towards the net.

The men crouching behind the wall hear the ‘thump-thump-thump!’ of an approaching outpost

of the colony. Nearer and louder it sounds, till, on the night stillness, it resembles the tread of a galloping horse. Suddenly the net shakes, and number one is fast in the meshes.

Thump-thump-thump! Pitter-pat, pitter-pat, pitter-pat! Everywhere rabbits can be heard; the whole place seems alive with them; yet, save for the shaking of the net and the occasional flash of a white tail, there is nothing to be seen. The noise becomes louder—here and there the dark outline of a cony is seen for an instant as it nips over the wall. The net veritably creaks—one thinks that the pegs must ere long be torn up by the solid weight of rabbits flooding into it; then there is a sniffing and a snorting, and close behind the rear-guard of the rabbit-colony the little spaniel heaves in view, having done his work well. The net must now be emptied without a moment's waste of time, for the rabbits are already escaping, like herrings from a salmon-net. In half-an-hour all is cleared up, and we hasten silently to the other side of the wood, or, perhaps, to the other side of the valley, to repeat the performance.

Rabbit-netting is generally regarded as a poaching, disreputable game, and so, alas! it often is; but in many parts of the country it is resorted to as one of the events of the year! In the part of Scotland where the writer lives, for example, no one troubles to shoot rabbits, there being so much nobler game to be had everywhere, with the result that in some seasons rabbits exist in thousands, a serious annoyance to farmers and foresters, eating the grass, and stripping the young trees of their bark. It is then that netting begins in earnest, and to the accompaniment of dry humour and an occasional wee dram a rollicking evening is

spent—often more remarkable for the amount of laughter it provokes than for the number of rabbits finally sent to market.

SNARES.

Rabbit-snares are generally set with the bottom of the loop the height of a man's clenched fist from the ground, the fingers one above another, and the thumb lying flat across the index-finger. (For a hare, the bottom of the loop should be placed an inch higher.)

The whole art of snaring lies in judicious selection as regards the position of the snare. The actual setting of it is merely mechanical, and can be learnt by any one, but it requires a huntsman's sixth sense to guide one in choosing the very best place for that deadly noose. At one time I used to set snares daily, and could almost state before starting out to inspect them just where rabbits would be found imprisoned; but returning to the same country after some years, I found, on trying my hand, that I had forgotten the art, or, at any rate, lost that guiding sixth sense that most hunters acquire in the special lines they follow. The old trapper knows by the general look of things where to make his sets, but he certainly could not tell you just why he knows or what it is that guides him. Constant practice, close observation, and what might be termed 'poachers' instinct' are the only guides to successful snaring of any kind, and the best way to acquire these is to be dependent on one's sets for one's next meal, as is so often the case when travelling in a pioneer country.

It is a mistake to cover the whole ground with snares; use as few as possible, placing them only on likely spots where they stand more or less

shielded from view. If the runway is closely examined, it will be found that it consists more or less of a series of patches, the rabbits taking off and landing at the same points while progressing along it—that is, treading in each other's footsteps, as already described. Therefore place the noose so that the rabbit will encounter it in mid-leap.

Do not use old wires. When a wire has been several times subjected to strain in all weathers it becomes brittle, and it is then only a matter of time before a rabbit gets away, to suffer torments from the tightly drawn noose about its neck. There is no economy in employing old snares, and their use is calculated to be abominably cruel, while it takes but a few minutes to renew the wires at regular intervals. Brass eyelets are made for the purpose, and should always be used; otherwise the wire lasts a very short time, and the noose can never be made to run so freely as is desirable.

The only hints I can give as regards choosing the position for the snare is to select the most likely-looking runway, and hide the snare in the best way possible. It will sometimes be found that rabbits are in the habit of running under a gate, having trodden the grass away below the bottom bar, and no better point could be chosen for secreting the noose. Never set a snare at the mouth of a hole or at a cranny in the wall; place it on one of the runways leading to and from the burrow along the edge of the wood, or a few feet from the cranny in the wall.

If the ground be of a consistency which does not permit it to hold the peg very firmly, it is not a bad plan to tie a branch across its centre to the top of the peg, so that, should the peg be drawn, the

branch will be dragged along crosswise, or at right angles to the path chosen by the rabbit. Thus if he tries to hole-up he is detained at the mouth; while if he keeps to the open he is not likely to travel far, the branch hitching up in the first fence or wall he encounters. At all events, the plan generally enables one to recover the snare, if not to capture the rabbit.

Very good results are often obtained by placing the snares in a wood where the runways are distinct, and where there is ample natural cover for the wire noose.

The Indian snare is by far the most humane, being designed to hoist the captured animal high into the air, out of the way of forest thieves such as cats and foxes. The noose is arranged as in an ordinary peg-snare, but instead of the cord being attached to a peg driven into the ground, it is fastened to one notched to engage with a separate ground-peg. The notched peg is attached at its other extremity to a cord holding down a sapling (or a branch) so that when the snare is sprung this sapling springs back into its natural position, hoisting the captured animal off its feet, and practically hanging it on the spot. There is not much chance of an animal escaping from a snare of this kind, as it is never able to obtain a fair purchase on the ground, and the device is used by the Indians not only for rabbits, but for foxes, bears, lynxes, &c., which would very soon gain their freedom by biting through the detaining cord were they able to get hold of it. The same plan is used for deer—even the gigantic moose and caribou—though there is no need to express an opinion on the matter of snaring such noble game in any country save in one where they are

urgently needed for food. This snare takes too much setting to be popular among rabbiters, and I have never known it to be used in the British Isles.

The foregoing, though in no way intended as a guide to the 'gentle art of snaring,' may prove of interest as a side-path of woodcraft concerning which so little is known by the respectable lovers of outdoor life. Truly the man who knows best the runways of wild nature is the man whose pocket is to some extent dependent on them; though such an individual, having gained his knowledge by years of toil and observation, is naturally somewhat reluctant to part with it.

MATING AND YOUNG.

Rabbits are polygamous—or, rather, they are wholly licentious as regards their marriage customs. 'Faint heart never won fair lady' is the code of the rabbit metropolis, and he who, by strength of hind-leg and readiness of tooth, is best able to hold his own against his fellows is, to put it bluntly, the father of the most children.

A doe wild rabbit probably begins to breed when three months old. Some naturalists put the age at six months; but since a rabbit is full-grown at three months, and it is no uncommon thing to find does that are not full-grown already heavy with young, three months would seem to be a conservative estimate.

The number produced per litter varies with the time of the year. An early spring or a late autumn litter may number only three or four, late spring and summer litters being from five to ten. The young are born blind and deaf; they begin to hear at the end of ten days, and their eyes to

open about the eleventh day. These data are the result of observation among the rabbits of the Pennine heights. The young are independent of their mother when about three weeks old during a season of plenty, and almost as soon as they are self-supporting she begins to bethink herself of yet another family. Indeed, it would seem that the female pairs again within twenty-four hours of producing her young; and having these facts to work upon, it does not require much imagination for one to arrive at an understanding as to how the rabbit survives.

Sometimes a buck and a doe will live together far removed from their kind. In this case some understanding of the marriage laws seems to exist between them. They are said to have been known to unite, for instance, to face a common foe in defence of their young, though it is true that here again deduction may be in error. Who can say that it was not a case of two does occupying the same burrow, and that, both having young, they united because each was moved by purely personal interests? I cannot imagine a buck-rabbit participating in any form of engagement involving personal risk unless he himself was directly concerned in the issue; and the idea of this beast defending its young, which, at the best, it never visits unless to destroy them during their mother's absence, hardly seems a likely proposition.

TEMPERAMENT.

Though closely allied in many ways, the rabbit and the hare are totally different from one another in character and temperament. 'Rabbit-hearted' is an expression commonly used not only by white races, but also by red and brown people, and except

in the case of a mother defending her young, this creature has no heart whatever. When pursued, it trusts to a short burst of speed taking it to the sanctuary of its burrow, and if foiled in any way and unable to find immediate shelter, it at once loses heart. I have known a rabbit, on finding its burrow closed, to begin immediately to run in foolish circles, screaming piteously, though its pursuer was nothing more fleet and formidable than a small boy, into whose hands the creature ultimately fell!

A rabbit's first dash for cover is exceedingly swift; but a hare, on the other hand, nurses and reserves its strength. It has no place of shelter to which to flee, and can look for escape only in the length of the chase. A hare starts off easily to test the speed of its pursuers; if they begin to close, it accelerates slightly; if they prove really fast, it resorts to dodging; and in this way it will foil, for minutes on end, a pair of dogs considerably swifter than itself. The twists and turns tire the dogs, rob their speed of its keenest edge, and when the hare runs straight again it is found that the pursuers can no longer gain. A hare will run till it dies; a rabbit often dies because it has not the heart to run. A rabbit is beaten as soon as it is foiled; a hare is never beaten. I have seen an exhausted hare, simply encompassed by men and dogs, settle down to dodging and manœuvring though its fate seemed inevitably sealed, till finally it triumphed over the seemingly hopeless odds, and by its own pluck and tenacity gained its freedom. On the other hand, a rabbit, losing sight of immediate shelter, becomes undecided which way to run, and either gives up all attempt at escape, or creeps into a hiding so absurdly insecure that the result is

the same. One has every respect for the hare, but neither the character nor the mentality of the brown rabbit is calculated to excite our admiration. It will return and nest time and again in the hollows of a swamp that is periodically flooded, and where death by drowning inevitably awaits its young; it has no morals to speak of, and no pluck whatever. True that it figures as an important item on the nation's bill of fare; but even here the rabbit does not pay its way, and only because it is to the poor man what the pheasant is to his employer is the existence of the creature justified.

HARDINESS.

Rabbits are not supposed to be particularly hardy animals, as they are said to be susceptible to damp, yet they seem capable of surviving under any conditions whatever. In the heights of the Scottish hills, where they live for seven months of the year amidst the driving wet of the cloud-wraiths, they flourish exceedingly. On every wind-swept island bordering the coast, though some are so bleak and rugged that practically nothing grows in the shallow soil, the rabbits fatten and multiply till periodical disease wipes them out. Among coast cliffs they are entirely at home. Here, on a dizzy shelf, the young are born; they grow up to share their burrows with the puffin and the shearwater; they become a crag-fast race of their own, thriving and multiplying till some, perforce, wander inland.

Amidst such surroundings the rabbit is, at any rate, secure from man. The peregrine, the buzzard, the weasel, and in some cases the eagle are its only foes; but so fleet and sure-footed does the cragland cony become in negotiating the perilous

shelves, so numerous are its hidings, that its feathered foes must be fleet indeed in order to catch it. The peregrine, hurtling from the blue, may meet with moderate success, but the carrion-eating buzzard and the eagle are easily circumvented, except by the very young. Thus the overflow population from a mile or two of rabbit-infested crags will keep the country inland well supplied with rabbits over a considerable area.

This animal's partiality for allotment gardens often tempts it into the suburbs of our great cities, where, for some reason unknown to any but itself, the rabbit takes up its residence, living in hourly peril, and with only the most doubtful burrow as shelter. At night-time Bunny creeps furtively forth into the cat-infested gardens, and eats an uneasy meal to the accompaniment of the clanging street-cars in the roadway just beyond. He dodges through the wooden fence at the heels of a tipsy reveller returning late to roost, and at dawn creeps for shelter under the floor of a laundry, where gray rats swarm, and human feet tramp all day perilously near his head. He is denied everything which for a rabbit makes life worth living; yet he is devoid either of the decision of purpose or of the sense of direction necessary to guide him back to happier and healthier regions! One can only echo the sentiments of the Christian nigger-boy who spent his time skinning rabbits: 'Thank God I ain't one of them!'

DESTRUCTIVENESS.

Rabbits do considerable damage on the grazing-lands which they frequent—not only by what

they eat and by so defiling the land that sheep will not graze after them, but by bringing about an entire change in the flora of their habitat. Where rabbits flourish the grass soon dies, and its place is taken by thistles, nettles, and other weeds which are very difficult to displace. The areas of useless sand-grass found in some localities are probably due to rabbits, the more useful growths that once clothed these areas having been killed off, so that the coarser, hardier growths finally took possession. On sandy hillsides the rabbits do considerable damage by casting up vast mounds of unfertile earth, and thus burying the fertile surface. The steep hillsides of the Tweed valley furnish examples of this on an extensive scale. Passing along this valley, particularly in the vicinity of Peebles, one is struck by the patched and mottled appearances of the hillsides, every second pasture on the steep slopes being dotted with yellow patches which catch the sunlight and stand out conspicuously against the background of green.

Farmers do not generally realise the full extent of the damage done by rabbits on their property. It is customary to let the shooting, if in the farmer's own hands, and the rent received for it is supposed to compensate for the damage done. On the many rabbit-shoots I myself have rented, however, it would, on almost every occasion, have been possible, had one cared to work, to pay the rent by selling the rabbits killed at sevenpence per head. Those rabbits cost the farmer more than sevenpence each to rear, and by letting the shooting he was by no means assured that the work of extermination would be thoroughly done. I do not mean to infer that farmers would be well advised to increase the

rent of their rabbit-shooting; on the contrary, from the tenant's point of view, it is seldom worth what is paid for it, and the best arrangement is for the farmer to come to an agreement with the tenant that, after a certain date, measures will be taken systematically to reduce the rabbit population—preferably by the employment of a professional rabbit-catcher. The man who is simply out for sport does not kill down the rabbits as they should be killed, and by February at the latest traps and snares should have been brought to bear, and should be kept in operation till they no longer yield results. The doe-rabbit killed in February could profitably be bought at ten times her market-price by the farmer on whose land she was killed, and this is a point he should bear in mind ere he decides to dispense with the rabbit-catcher's services.

LENGTH OF LIFE.

So few wild rabbits die by the kindly hand of Time that it is difficult to arrive at their natural length of life. In an enclosed park in the West Riding a rabbit, distinguishable from his fellows by a white ruff about his neck, was seen by the family at breakfast almost every morning for nine consecutive years. He was born about the same time as the eldest son of the house, and, curiously enough, he died, judging from his disappearance, on the same night as the child's grandpa died! His name went down with the family traditions.

This rabbit lived a hedged-in and protected life in the precincts of a city, and under such conditions he might, indeed, have lived to see his fifteenth year. How long a wild rabbit lives depends upon the speed at which it lives. Safe

from its foes, passing its days in peaceful security, it would probably live many years longer than if it were eternally but unsuccessfully chivied by stoats and lurchers. Since normally wild rabbits live less strenuous lives than hares, they live proportionately longer. I should set down the average life of the normal wild rabbit at eight years; senile decay generally sets in rapidly at the end of the ninth year, and few of them live to reach eleven.

WEIGHT.

The weight of flourishing adults is generally between 3 and $3\frac{1}{2}$ lb. The first figure may be taken as the average; $3\frac{1}{2}$ lb. is a good market rabbit, though during favourable seasons 4 lb. is not an uncommon weight in some localities. Contrary to what obtains among hares, the bucks are generally the heavier.

THE HEDGEHOG OR URCHIN.

WHAT boy who has ever camped out is unfamiliar with Milord the Hedgehog? Who has never heard his nocturnal rustling in the leaves, his loud sniffs of inquiry; and, above all, who has never experienced his unwavering partiality for the frying-pan? Have we not always to hang this universal piece of culinary equipment high in the trees, or bring it into the tent? Otherwise he will spend half the night climbing in and out of it, and skilfully contriving to mix a maximum amount of the soot of the exterior with the thin grease of the interior.

But, believe me, the hedgehog is a jewel to have about the camping-ground compared with his counterpart, the Canada porcupine. The hedgehog may possess a strong partiality for anything that suggests the least flavour of salt, but with the porcupine this partiality amounts to a mania. I have known a porcupine to eat a whole packing-case because there was a tradition attached to it to the effect that it once contained salt kippers; and later, remembering the packing-case, the same porcupine calmly settled down to eat a hole through a canoe, thinking that, if it wasn't salty, it ought to be! Having visited the camp twice, a porcupine thinks he owns the place, and you have to clout him out of the same old mischief with the same old frying-pan a dozen times a night.

The hedgehog is truly an ancient creature, and dates at least from the upper and middle Miocene of European strata. It was well known to the ancient Egyptians, and figured in their art.

Though seemingly nearly related, the similarity between the hedgehog and the Canada porcupine is not a lasting impression. The hedgehog is a stoic; the porcupine is impulsive and spasmodic. Both depend on their quills for protection, and so naturally have contracted certain habits that are in common—such as the habit of moving noisily about, and the utterance of fretful sounds when disturbed. The porcupine is almost exclusively a vegetarian, and will remain in one tree till he has stripped it of every leaf and bud, never descending unless a golden opportunity of making a nuisance of himself is seen; but the hedgehog feeds almost entirely on the earth. A porcupine seldom diverts from a strictly vegetarian diet, and I have never heard of a hedgehog eating green vegetables of any kind. This creature is, indeed, a purely carnivorous feeder.

Food.

A hedgehog will eat almost anything of animal origin. Slugs of all varieties, many of which birds will not touch, are perhaps its staple diet, accompanied by every species of beetle and insect that flies or runs.

In Upper Wharfedale, near Burnsall village, I possessed a unique opportunity of studying the feeding habits of the urchin. A picturesque wood, particularly rich in animal life, extends from the moorland heights to the river-level, and is bordered on its lower boundary by a wide belt of sand, deposited by the main stream, which every creature passing between the wood and the lowland meadow must cross, thereby leaving the record of its passing.

The belt of sand is dotted over with pebbles

large and small, and here black beetles of several varieties are particularly abundant, hiding during the heat of day under the shelter of the stones, so that, crossing the sand-bed, one is certain to send dozens of them scuttling in different directions. In running across the sand they leave the familiar race-like tracks of their passage, and by carefully following out one of these tracks one can without much difficulty trace a beetle to its hiding, though in most places the beetle-tracks are so interlaced that tracking becomes impossible.

From the signs left by hedgehogs it was clearly evident that they hunted these beetles by scent, running the trail of an individual beetle just as a hound runs the trail of a fox. When fishing at night-time I have seen as many as three hedgehogs hunting the sand-bed together, while others could be heard not far distant in the darkness. If, however, one trod out on to the gravel-stretch, where a silent approach was impossible, every hedgehog would scuttle into the wood almost with the alacrity of a rabbit. The hedgehog is, indeed, more fleet of foot than is generally thought. If one be surprised it merely twitches into a ball, making no attempt at escape, but trusting to its quills for defence; but if, on the other hand, it hears the approach of danger in the distance, and knows that there is time to flee, it will make off quite speedily to some familiar cover. Once in the dusk of evening I shot a hedgehog in mistake for a rabbit; it was working a hedge-bottom, possibly in pursuit of mice, and was so quick in its movements that much surprise was occasioned by the discovery of the error.

Allusion has been made in the chapter on Badgers to the draining-gutters that border the

ridings of the New Forest. It is no uncommon thing to find hedgehogs making use of these gutters, just as the badgers do, doubtless attracted by the insects that fall from the herbage above and become imprisoned there. It is quite possible that the hedgehog might find itself unable to escape from a cutting for some considerable time, though the creature would fare quite well during its imprisonment.

From the sand-bed previously alluded to an overflow arm of the river ran out across the pastures. One of its banks was so undermined by flood-waters that it formed, as it were, a wall, and beneath its overhanging edge was a shelf of which free use was made by the rabbits. The hedgehogs also used this shelf, for in the sandy wall all manner of sand-burrowing flies had their homes, while slugs and worms were apt to fall from the fibrous roots of the grass-covered brow. Emerging from the wood, the hedgehogs seemed to have a fixed routine. First they would explore the sand-bank; then, following the overflow arm by the sandy shelf, they would ultimately gain the river half a mile distant; finally returning to the wood by a slight detour under cover of the walls and the nettles.

As a rule, however, the hedgehog is not a creature of fixed runways. It has a strictly defined home-range, which extends, probably, not more than a hundred yards in any direction from its recognised sleeping-quarters. It is entirely a creature of the night. In the day-time it ventures abroad only when warm showers disturb vast numbers of insects, causing them to creep forth into the foliage. A hedgehog will then sally out to take advantage of the feast. The only other times

when it is to be seen abroad by day are either during frosty weather, when food is scarce and the animal is hard put to it to pick up a living, or while it is suffering from the effects of an injury.

The hedgehog's method of hunting is most remarkable for its entire lack of systematic quartering. Hither and thither the creature goes, as regardless of direction as a clockwork mouse. Now he heads north at quite a sprint, then turns west for no apparent reason at all; veering south, he noses under a dock, then continues east till his progress is barred by a wall. All the time he is munching steadily and noisily, consuming an enormous number of insects; and in this way he rids the land of many troublesome pests. Bats and swallows hawking for insects are, of course, equally erratic in their movements, so the apparent want of system of the hedgehog is quite excusable on the same grounds. If one keeps quite still, the animal will, when hunting thus, come right up to one's feet, which he seems to regard as a natural feature of the landscape.

AS RABBIT-KILLER.

A hedgehog will eat anything it can catch and hold; nor is it particular as to its method of killing. It is regularly guilty of robbing the rabbit-catcher's snares, and thereby often brings destruction upon its own head. The rabbit fast in a snare that is discovered by a hedgehog must, indeed, experience a bad time of it, for, like all animals that are not among the true killers, the hedgehog has no idea of inflicting a merciful end.

Hedgehogs destroy quite a considerable number of young rabbits; but I think the animal's love of warmth, and its habit of creeping into any snug

and cosy nook that presents itself, is in the first place the cause of the mischief. Finding a rabbit-stop during the absence of the mother, the hedgehog creeps in to enjoy the warmth of the nest at the end of the shallow hole. Whether or not he eats the young makes little difference. Their chances of a healthy survival are small with a hedgehog as temporary bed-mate. His first intention is not, probably, to destroy. He may already have fed, and is merely in search of warmth and sleep. The idea of eating the youngsters presumably occurs to him as an after-thought; and having gorged, he sleeps again, in all probability occupying the stop for three days or so. He may even finally make his home there.

The sentiments of the mother-rabbit on returning, to find the narrow hole filled from top to bottom and from side to side by a stubborn ball of prickles, can well be imagined. Her helplessness is complete, and realising this, she promptly forsakes the nest.

Having once profited in this manner by the discovery of a rabbit-nest, a hedgehog quickly acquires the habit of hunting for such places. Thus a single urchin may make enormous inroads into the rabbit population of a given area during the spring and summer. In Upper Wharfedale hedgehogs are particularly numerous, and times without number I have thrust my hand into a stop presumably containing young rabbits to find a hedgehog occupying it. Indeed, it was the exception rather than otherwise for a rabbit nesting on a certain sandy hillside to bring off her brood successfully; usually she was victimised by the hedgehogs a day or two after her young were born, and on numerous occasions we have

caught the murderer walking about with a litter of rabbit-down and other nesting materials entangled in his quills.

To sum up, then, the hedgehog is among the most potent of the rabbit's foes. True that it takes only the very young, before the merciless weeding-out process has had time to operate, and that many of the rabbits the hedgehog destroys would be destroyed in other ways ere they became adult; yet the hedgehog takes not merely one or two, but the whole family. Many may consider, however, that the keeping down of the rabbit population, combined with the hedgehog's undoubted effectiveness as a devourer of noxious insects, is an argument which pleads for the animal's preservation.

ON THE GAME-RESERVE.

From the point of view of the farmer the hedgehog is of unquestionable service to man; but, unhappily, the activities of this creature are not limited to the destruction of mice, insects, and rabbits. On the game-reserve the hedgehog does little good, while it is capable of doing a great deal of harm.

So far as my own experience goes, I have never found striking evidence of the hedgehog's destructiveness to game-birds, but weightier opinions than mine amply warrant the condemnation. It is conceivable that a hedgehog, finding a pheasant's nest, would be attracted to it in just the same way as it is attracted to a rabbit's nest. The idea of devouring the clutch would not necessarily be the initial impulse; the hedgehog would first be drawn by the warmth and comfort suggested by the nest, and from this it is but a short step to

the discovery of the waiting feast. And, having once feasted, the animal would undoubtedly profit by the experience, and thereafter search diligently for similar banquets.

Many naturalists are of the opinion that hedgehogs feed largely on the eggs of ground-breeding birds during the spring of the year, but this is evidently a case of individual acquirement. Where many ground-birds nest, the hedgehogs soon discover that nest-hunting is a profitable business, but where such nests are comparatively rare the animals do not seem to learn their value. I have, for example, known tree and meadow pipits to rear their young successfully in a bank which a whole family of hedgehogs were in the habit of parading nightly for food. I have also seen a conspicuous pied wagtail triumphantly bring off its family affairs in a kitchen-garden within the confined limits of which a hedgehog was imprisoned. These facts would seem to indicate that egg-hunting is an acquired art in the case of the hedgehog, just as it is in the case of the squirrel.

I believe, on the other hand, that hedgehogs destroy quite a number of fledglings of all kinds that have just left the nest to sally forth on their first perilous voyage of discovery; but it is futile to condemn the creature on these grounds when the 'tame' cats of our own households accomplish more destruction in this direction within three days than a wild hedgehog does in a year! Indeed, we are only too apt energetically to persecute some creature of the wild for sins which we somehow overlook in our own domestic felines; and practically every crime for which wild creatures are destroyed, resulting in the total extermination of not a few, is perpetrated by the cat which hunts

abroad, and probably on a far more extensive scale. I have known a whole family of badgers to be wiped out for alleged misdeeds which continued after the poor creatures had ceased to exist, and which were doubtless attributable to a wild cat of the 'tame' variety. I have even found a landowner to urge the destruction of hedgehogs on the ground that they destroyed game-birds' nests, while on a single one of his farms there were sufficient half-wild cats to exterminate every pheasant-chick within a radius of miles! For the half-wild cat, like the hedgehog, attacks at the very root; she takes not one or two, but the whole brood.

ASSOCIATIONS WITH THE GRAY RAT.

But one thing may be said in favour of hedgehogs on game-reserves—that where they exist in any numbers 'summer' rats do not readily take up their quarters. This is not on account of any particular dread on the part of rats of meeting a hedgehog, for of all creatures the gray rat is best able to look after itself, but simply because rats and hedgehogs do not make good neighbours. The rats know that it is of no use arguing with a hedgehog; when the latter wants a thing he goes right in, and either he gets it straight away or it means a fight, and from a rat's point of view a fight with a hedgehog is not worth while. I have known a certain little valley in the midst of a pheasant-covert to become literally alive with rats during the summer months, and doubtless the damage they did at night-time was enormous. Had there been a family of hedgehogs resident in that valley the rat plague would never have occurred; for, knowing that at all events the hedge-



THE HEDGEHOG—'SMALL GAME.'

hogs will not move elsewhere, the rats simply avoid the place.

Certainly it is not probable that the hedgehog has sufficient sense to avoid an encounter with the gray rat, fierce and terrible fighter though the latter may be; in fact, I am quite convinced that a hedgehog would devour either young or old rats when the chance occurred just as readily as it would devour any other small creature that fell within its power, and quite heedless of all consequences. Truly does the saying, 'Fools step in where angels fear to tread,' apply to this creature, for a hedgehog will deliberately trespass within the stronghold of a veritable army of rats, and there commit a crime sufficient to bring immediate and dreadful disaster upon itself when it is in the power of the rodents to inflict it.

The incident on which this statement is based occurred when I was a boy in the West Riding. At the back of the house were a number of ancient outhouses, which at that time were occupied by one of the periodical rat-swarms. One evening when passing near I heard a squealing and scuffling issuing from some nettles behind the outhouses, and, peering cautiously over the wall, was surprised to see two or three large rats circling round a hedgehog, endeavouring apparently to find a vulnerable point in the creature's armour. The hedgehog appeared quite undisturbed, and, though not rolled up, its coat of prickles seemed to be drawn so far forward as to defend its head. While I watched, the animal sauntered calmly off, quite undismayed by the attack of the rats. Going to the place where it had crouched, I discovered the skin of a young rat, perhaps half-grown, eaten completely empty. Evidently the hedgehog had

caught the rat and killed it, calmly settling down to the meal while the outraged adult rats spent themselves in impotent fury!

This incident seems to cast some light on the hedgehog's abilities as a rat-killer, but at the same time I have known a hedgehog to be very severely mauled by rats. This happened at the same place some years later, when we discovered a hedgehog, apparently in a drowning condition, floating down a brook which flowed near the house. On examination we found it to be covered all over with rat-bites, and in a mortally wounded state—so mangled, indeed, as to be unable to swim. The rats of the outbuildings claimed the banks of this stream a little higher up as part of their territory, and seemingly the hedgehog, trespassing within their domain, had been chastised in consequence.

Owing to its armament, a hedgehog could probably kill any normal gray rat in single combat, and it is easily conceivable that so prudent a creature as the last named would readily avoid all likelihood of argument with such a gentleman. Even though a massed attack might result in the defeat of the hedgehog, the experience would not be pleasant for the rats participating in it.

SNAKE-KILLING.

Hedgehogs are supposed to kill snakes, but here again we have another example of the creature's tendency to try to eat anything it finds. The hedgehog does not begin with the idea of killing; it sets out merely with the idea of eating, and whether it happens to come across a worm, a snared rabbit, a snake, or a dead kitten, the result is the same. If the creature proves troublesome, the hedgehog advances its bayonets and quietly

persists; and no matter what the encounter in which the animal finds itself involved, there is no ferocity or malice on the hedgehog's part. Its intention is to eat, and the creature that objects to being eaten must either defend itself adequately or get out of the way.

Thus the hedgehog is just as likely to prove snake-killer as it is to prove frog-killer. Seeing a snake, it would undoubtedly attack the reptile, and the supposition seems to be well founded that the victim thereafter beats itself to death in fruitless attacks upon the hedgehog's armament. This effectively accomplished, the hedgehog calmly settles down and eats the snake.

A common belief also exists that the hedgehog is sometimes guilty of sucking cows; but the hedgehog's sharp teeth and inadequately shaped mouth are features which would exclude all possibility of welcome relief on the part of the cow thus imposed on.

THE QUILLS.

It has been said that the hedgehog is a far more active creature than is generally supposed. One kept imprisoned in a garden was fond of climbing up the trellis-work that supported a dense creeper on the sunny side of the boundary wall. Several times it was found there, seven or eight feet from the ground, and there in a bower of leaves it had its day-time nest. Unfortunately it died ere winter came, or in all probability it would have hibernated in the creeper.

Again, hedgehogs are prone to climb into honeysuckle or some other flowering creeper in pursuit of the bees that are attracted by the honey and the sweet perfume of the flowers. In the destruction of bees, however, they are less active than

mice, and probably pay their way from the bee-keeper's point of view by scaring off the mice. I remember once examining a clover-patch near to some hives in a Northamptonshire garden, and finding the ground liberally littered with the wings of bees killed by mice.

The hedgehog's coat of spines is designed not only to protect the creature from bird and animal foes, but also as a safeguard against the effects of falls. A hedgehog has no fear of falling. A twelve-foot drop on to a bed of decaying leaves causes the animal no discomfort whatever, and may be undertaken in the ordinary course of travel. Just as a black-bear, feeding in a tree, will loose its hold and drop fifteen or twenty feet, striking the earth as a closed-up ball and rebounding into safety ere its disturber has time to realise anything, so a hedgehog, finding in its route a twelve-foot drop into a quarry or over a boundary wall, will unhesitatingly topple over, striking the earth like a ball, and remaining rolled up till it comes to rest, when it coolly uncurls and trots off in search of insects. Hedgehogs are, indeed, fond of rolling and tumbling, and their spines are so designed that even a heavy blow delivered on the business extremity does not cause them to penetrate at the roots.

A friend of mine in Northamptonshire kept a tame hedgehog in his garden, and one day, when the creature was prospecting among the wall-flowers that grew in the mud-coping of the ancient garden wall, it caused great distress to my friend's children by losing its balance and falling. Convinced that their pet must be badly injured, the children were rather surprised when the hedgehog promptly mounted to the top of the wall by the

rockery, and again fell off—as though for no other reason than that of making itself conspicuous!

I have, when rabbit-shooting, seen a hedgehog roll down from the top of the hedge-bank to the bottom—presumably as the quickest and easiest way of getting there; and doubtless, by rolling, running, and dodging through the densest thickets, a hedgehog can cover a considerable amount of ground during its evening rambles.

The quills of the urchin are subject to the perfect control of the muscles of the skin. The skin can be moved forward so that the quills, pointing in a forward direction, protect the animal's face and head from assault while it is eating. In this way it is able calmly to devour the young of a desperate woodland mother, while the bereft parent merely brings injury upon herself by her attacks. The case quoted of the hedgehog devouring the young rat, while other rats vainly attempted a belated rescue, is an example very much to the point.

When a hedgehog is rolled up, the quills are so placed in the skin that they point in every conceivable direction. It is impossible to touch the creature without meeting a bayonet-point, though ordinarily, when the hedgehog is running about, the quills lie flat on the skin, so that it can be stroked without discomfort to the stroker.

As to whether or not this animal should be destroyed is purely a question of locality. In gardens it is beneficial, and worth cultivating as a pet. On game-reserves only is it detrimental to man's interests, and so much of the fauna of the country is sacrificed at the shrine of the sacred pheasant that the destruction of hedgehogs can safely be left entirely to the game-keeping fraternity. Gipsies kill hundreds; and now and then

a dog of good mettle, that has been badly pricked by a hedgehog, develops a spite against the breed, and thereafter kills every one it finds. I possessed one dog that must have killed hundreds during its life, for whenever it was taken into the woods it would seek out one or more of these creatures, and never rest till its purpose was achieved. Nor could the dog be broken off this bad habit.

Apparently the hedgehog has no fixed moulting season; new quills are always growing and old ones being shed. As the animal ages, the quills become very stiff and strong, and turn grayish in colour. A young hedgehog is generally brown, an old one yellowish-gray, the quills being more distinctly barred than in youth.

ENEMIES.

Other than man and his dogs, the hedgehog's enemies are few. Among the birds of the air it has none, which appears to be amply proved by the fact that it seems quite incapable of looking up. Foxes destroy a few hedgehogs, but not many. During a hard winter a fox will scratch out a hibernating hedgehog and devour it, leaving only the skin; but such is the discomfort of the proceeding that Reynard leaves the urchin alone unless the stern alternatives be urchin or starvation. On one occasion a river-keeper reported to me the finding of the empty skin of a hedgehog among some rocks near an otter's den. In all probability the otter killed it. The pine-marten, though rare, is, with the polecat, the most deadly of the hedgehog's animal foes; and it is said that the polecat not only goes out of its way to destroy these creatures, but having destroyed them, eats bones and even quills without ill effects. If this be so,

the case is analogous to that of the fisher and the porcupine. The fisher, which is a larger member of the polecat family, is particularly partial to porcupine, and the deadly quills of this creature, each quill armed with numerous minute barbs which prevent it from being withdrawn should it penetrate an animal's flesh, curiously enough cause the fisher no discomfort. Entering its flesh, they work inward to lie under the skin, finally collecting along the back to work out at the roots of the tail. Any normal creature that attacks a porcupine is almost inevitably doomed to a fate of the most terrible and lingering kind; but in this respect the fisher is an exception, just as the polecat may be an exception in its methods of dealing with the far less formidable hedgehog.

As to stoats habitually killing hedgehogs, it would seem unlikely, for I have known hedgehogs to amble about in the dusk of evening in apparent immunity where stoats were most abundant. The keeper with a club and with a *penchant* for killing every four-footed creature he sees, the gipsy-boy, and the terrier are the hedgehog's only foes that count for anything.

HIBERNATION.

By early autumn the hedgehog has become fat and lubbardly, and as the weather turns colder, and the russet leaves come drifting to earth, the animal grows more and more torpid each day. Its quills are not very adequate for keeping out the wind; but its skin is strong and thick and not very sensitive to cold, and under the skin is the hedgehog's real overcoat—a thick layer of fat which resists the cold, and on which the animal subsists during its winter sleep.

I have repeatedly noticed a curious and interesting habit of this creature during the days of autumn. As soon as the wind becomes cold, the hedgehog begins to acquire an overcoat of leaves. It may be said that this is purely accidental, that it would be quite impossible for such a ball of prickles to move about when the woods are thick with leaves without acquiring such an overcoat; but at all events, accidental or not on the hedgehog's part, it would appear to be one of nature's provisions. As the cold weather comes, the hedgehog is to be seen running hither and thither in its coat of leaves, making as much noise as a team of foresters. Then, as the days pass, and the weather becomes still colder, the hedgehog collects a second coating, and yet a third, each new covering ramming the previous one farther home, till the leaves are impaled to the very base of the quills. The work is done so thoroughly that it could not very well be due entirely to chance; and it needs to be borne in mind that such an overcoat resists not only the cold wind, but also the rain. Moreover, during the autumn, a hedgehog has been watched purposely rolling down a leaf-strewn bank, ascending, and rolling again, apparently with no other object than that of collecting leaves.

It would seem that the habit plays an important part in the history of the hedgehog's hibernation. It is the first step in the direction of denning up. Equipped with an efficient, though artificial, overcoat, the animal very soon becomes sluggish in its habits. Its den is probably lined with leaves, and the covering of leaves on its body lessens the contrast in temperature when at intervals the animal quits its nest.

By late October the hedgehog is seldom seen

abroad and is difficult to find. It remains nocturnal in its habits, but is abroad only for a short time during the night. The drowsiness of winter is taking a firmer and firmer hold; but if the earth be frost-bound, and the days bright and sunny, it may steal out for a little during the warmth of midday, though more probably it does not venture out at all.

Thereafter, till the middle of March, the life of the urchin is more or less of a closed book. Whether or not its sleep is generally unbroken throughout the long winter is difficult to say. If so, the hedgehog is rather an exception. Bats, mice, squirrels, &c., which are supposed to hibernate, take their hibernation less seriously than is generally thought. If the conditions are in any way favourable, they are up and abroad for a brief spell of activity; but certainly it would seem that the hedgehog is the most truly hibernating of all our mammals, and I am inclined to think that if a hedgehog is abroad during the winter, it was in such poor condition when it denned up that it has found itself unable to stand the long drainage on its strength. A healthy hedgehog, in perfect condition when it denned, probably does not emerge till the joyous spring calls it back to the world of activity.

THE DEN.

A rabbit-stop generally serves as the hedgehog's winter den. Into the den an immense quantity of leaves is dragged, not only forming the nest, but effectively excluding all draught by filling up the passage. On one occasion we unearthed a hibernating hedgehog. The mouth of the small hole was so filled with decaying leaves

that one could never have told a hole existed there. Out of the passage we dragged at least a sackful of leaves, and when the hedgehog himself was removed he lay perfectly still, partly uncurled, making no effort at self-defence, and apparently still sleeping a deep, untroubled sleep.

A decayed tree-root may be used, and grass may function as bedding material instead of leaves. Even sheep's wool may be dragged into the nest—anything, in fact, that suggests the desirable warmth of covering. A hedgehog will hibernate in thick ivy, perhaps a few feet from the ground; and one took possession of some sacks in a corner of my motor-house, and there settled quite contentedly, though the house was in frequent use. Its habits, however, were so unclean that ultimately we were compelled to eject it. Curiously enough, it appeared in midwinter, so evidently it had been compelled to abandon its previous den. I have known one to try to den up in a potting-shed till it was forcibly ejected by the gardener; in fact, it is impossible to lay down fixed rules as regards the location of this creature's winter abode, as it will den up anywhere that suggests the desirable degree of warmth and comfort. Nor does it appear to be opposed to changing its den in midwinter, as it may try half-a-dozen different retreats, from each of which it is ejected, ere finally it disappears.

No doubt the first call of spring finds the hedgehog community sadly reduced in numbers. Some have chosen their nesting-sites unwisely, and simply do not waken; while others, with the torpor of winter still upon them, have fallen victims to their foes.

Those that successfully sally forth with the

spring, however, do so in a feeble and half-comatose condition. Nature's wakening, like nature's falling asleep, comes by degrees. The first journey forth is slow and short, for the creature is sorely handicapped by the softness of its paws. This is nature's safeguard against the overloading of the stomach, the muscles of which have become weak by long inaction. A few mouthfuls of food gathered near the den, and the tenderness of the feet sends it back to cover, where its stomach has ample time to recover ere again it sallies forth—this time a little farther; and so on till its normal condition is regained.

The hedgehog does not lay up a winter store, as do mice and squirrels. Its store is on its back, and serves not only as sustenance during the foodless days of sleep, but also to exclude cold. The storage habit does not seem to exist in the case of this creature. There is no reason to think that it ever resorts to stowing food in its den or elsewhere; its method of going through life is to gorge to repletion, sleep, then gorge again. Its food is generally abundant; it will feast on carrion, apart from the varieties of fresh food which are generally at hand; and, if astir during the lean nights of winter, it will visit village garbage-heaps, eat its fill, and den behind the open kitchen door if such shelter be undisputed. Normally it has little fear of man; in midwinter it has none; but, as previously stated, hedgehogs that are astir at this time are probably sick, or they denned up in poor condition.

INDIVIDUALITY.

There is a good deal of individuality among these creatures; that is, an individual specimen

may develop habits peculiar to itself. One hedgehog we had under observation spent a good deal of its time rooting among the old dry cow-dung dropped in a pasture, evidently for the grubs and the beetles found within it. Evidences of the creature's work were on every hand, though this curious habit on the part of an individual seems to stand out as exceptional. Others, as already stated, doubtless take up egg-hunting as a profession, though not all are guilty of depredations of this kind. One was known to enjoy for a considerable time the warmth of a hen-roost without misconducting itself in any way.

FIGHTING AND VOCAL POWERS.

Hedgehogs fight furiously with one another—sometimes, it is said, to the death. I have watched them squabbling for the possession of a frying-pan, but have never seen a couple in close combat.

They possess a fairly wide range of vocal powers. When searching for food a hedgehog sniffs and grunts in a most fearless manner as it walks about; and if in distress, it utters a wailing sound not unlike the cry of a hare. It can sometimes be made to utter this sound, when rolled up, by turning it over and tickling its hind-feet with a twig. Also, when several are abroad together at night, they occasionally utter a bleating call of peculiar cadence; it appears to be done partly as a challenge and partly as an expostulation.

Like all animals that are lovers of warmth, the hedgehog entertains many guests, and I well remember the horror that prevailed when this discovery was made on a hedgehog being placed

in the centre of the drawing-room floor to entertain a number of lady callers !

BREEDING.

According to the best authorities gestation occupies seven weeks. The young number from four to eight, and the first litter may be born as early as the end of March. The first mating season, then, must be early in February, as soon as the creatures begin to move from their winter quarters. A second litter is produced between the middle of August and the middle of September.

According to Gilbert White, the young are born blind, and the quills, though present, are flexible and white. At the age of eight days or so the young begin to sally forth with their mother. They are then more or less at the mercy of their foes, for their quills are still so soft as to afford little protection. So far as one can ascertain, they remain with their mother till full-grown ; and even after that they probably do not wander far from the locality of their birth, as the whole family, now composed solely of adults, may be seen together throughout the season.

WEIGHT.

The weight does not appear to vary so much with the seasons as might be expected, though I have never had the opportunity of weighing one early in the spring. The male that denned up in my garage weighed only 1 lb. 5 oz. in midwinter. Another specimen, taken in midsummer, tipped the beam at 2 lb. 7 oz. This seemed rather a

big hedgehog, and the average weight in midsummer is probably about 2 lb.

LENGTH OF LIFE.

Considering the sedentary and sheltered life it leads, the hedgehog is not a long-living creature. One that had spent the major portion of its time in captivity seemed to be showing signs of old age in its fifth year; unluckily its fondness for water ended its well-meaning, ill-doing career ere the hand of Time struck the inevitable hour. Five or six years would appear to be the hedgehog's allotted span. A hardy specimen may still be flourishing at seven, and may live to see eight. Unfortunately, hedgehogs kept in captivity usually contrive to come to an untimely end ere old age steps in, with the result that it is difficult to arrive at a definite conclusion.

THE SQUIRREL.

WHERE squirrels exist, the woods always seem the richer for their presence ; but, alas ! this is generally the opinion of the passer-by rather than of the owner of the woods. In the hardwood-forests of the south of England timber-growers do not seem to be very much troubled by the activities of squirrels, but in the fir-forests of the north this beautiful little creature is often guilty of severely damaging young trees, stripping the saplings of their bark and their tender shoots so ruthlessly that it may kill every tree in a planting if left undisturbed to its work. The result is that in some localities the destruction of the squirrel has been so energetically pursued as considerably to reduce its numbers, if not entirely to exterminate it ; while in other districts, where the forest-owners have suffered to a less extent, squirrels have been left to multiply. The variation in treatment to which it is subjected chiefly accounts for the uneven distribution of this rodent.

Though never idle save during exceptionally cold snaps, squirrels are seen at their best when the leaves begin to fall. At this season the animal spends much of its time on the ground, with the result that our attention is drawn to it by the rustling in the leaves ; and as the squirrel climbs into the branches he is more visible than in summer, when the trees afford his little russet form the shelter of their foliage.

Though naturally highly inquisitive, squirrels can be very coy when so disposed. Recently I saw three of them seek the shelter of a solitary

white-thorn bush on our approach. There was no other cover near, the bush standing alone in a field; yet as we passed within a few feet of it nothing could be seen of the squirrels, so cleverly had they made the best of what little cover the leafless twigs afforded. In the woods, the squirrels desirous of avoiding detection manage always to place the trunk of a tree or a good stout branch between themselves and the passer-by, clinging to the bark and edging in jerky movements this way and that; and so still do they keep on thinking themselves unobserved that it takes a keen eye to pick them out. The result is that, travelling through woods where they abound, one may catch only an occasional glimpse of a fleeing red coat, the squirrel generally disappearing as soon as he has gained the branches. If not molested, however, they become very tame, and the gray squirrels in the park at Exeter can be seen any day taking food from the hands of children.

STORAGE.

The squirrel is notoriously a food-hoarder, and quite early in the autumn the storage fever seems to take possession of him. At this season each squirrel has his individual range, seldom travelling much more than a hundred yards from some central point. This point is possibly a hollow tree, deep down in which the little tree-dweller has his home, consisting of bed and larder—chiefly larder. Here, quite early in the season, the squirrel begins to lay up his winter store, but it is to be feared he is not very methodical about it, busily storing one day, and eating a good deal of what he has stored the next. He opens nuts by gnawing the small



THE SQUIRREL—'THE FOOD HOARDER.'

ends, then splitting the shells vertically, just as one would do with a penknife. The squirrel never wastes time and energy over cracking bad nuts, evidently being able to tell by their weight whether the kernel is sound ; and the apparently sound nuts often found in a squirrel's abandoned larder will, if opened, invariably prove to be empty. Among rocks, these abandoned larders are often seen to be half-full of empty nuts.

Autumn being a time of plenty for the squirrel, there is no particular haste as regards the winter store, and having laid aside a goodly stock in a hollow tree or a cranny among the rocks, the little animal now resorts to a curious practice, which for a long time puzzled me. It is October, and he is to be seen climbing nimbly into the branches of nut-bearing trees, from which, at regular intervals, he descends to earth, runs off to the forest-edge, and scratches a hole in some soft piece of ground, where he buries his find. This done, he ascends the tree again ; then duly buries another nut in another place ; and so on time after time for so long as the sunshine lasts. In the Bolton Abbey woods I have watched squirrels thus employed during the greater part of the day, generally using for their burial-ground the exposed earth of a land-slide or some other treeless patch, but I have never been able to find the nuts thus buried.

This is all part of the storage system. The squirrel cannot, of course, remember the exact whereabouts of all his hastily made *caches*, numbering, as they do, many hundreds, but he retains a hazy notion that in such and such a bank nuts are buried, to be found by the diligent searcher. Meantime the food is safe, as nuts are best preserved in damp ground, and should keen frosts

come it is as secure there as it could be anywhere. But the wisdom of Nature's whole scheme is this—that should the squirrel not find or not require the nuts he has buried thus, they duly grow into trees, enriching and extending the forests with the food-bearing growths on which the squirrel is dependent. The squirrel is, then, a natural planter of forests, selecting for his planting a patch of soft, open ground where forgotten nuts would be most likely to spring into trees, obtaining ample sunshine, and unhampered by the growth of other timber. Thus it may be said that just as the squirrel is largely dependent upon oak, beech, and hazel, so these trees, in the virgin state of nature, are largely dependent upon the squirrel.

During the autumn harvest one squirrel very much objects to a rival red-coated harvester trespassing upon his home-range, chasing any visitor from tree to tree should the interloper venture within the prescribed boundary of his territory (see *MATING*). The nut season, however, is all too brief, and having laid in his store, the squirrel, providing the weather remains mild, divides his time between the berry-bearing bushes and the moist leaves which carpet the earth, scratching about among the latter for covered nuts, 'mush-rooms,' and the bulbs of woodland plants. There is nothing like wet leaves for protecting the earth from frost, the first keen night freezing the topmost layer, and forming, as it were, a roof which the frosts that follow do not easily penetrate; so that, protected by the natural warmth of the earth under a coating of frozen leaves, the food of so many wild-folk is preserved throughout the keenest weather.

In dealing with the red squirrel of Canada, Seton

makes an interesting observation with regard to the storage of fungi. Our own red squirrel feeds to a considerable extent on the poisonous-looking mushrooms that grow in sheltered woods, and it is probable that Seton's observations are applicable to the squirrels of this country also. He says: * 'The second food-supply in winter is mushrooms, chiefly of the genus *Russula*. If these were to be stored in the same way as the other provisions, they would doubtless rot long before they could be of service. The squirrel stores them in the only available way—that is, in the forked branches of the trees. Here they are safe from the snow that would bury them, from the deer and field-mouse that would steal them, and instead of rotting, they dry up and remain in good order until needed.'

It would certainly seem that squirrels exercise a good deal of judgment in the selection of suitable storage-quarters; and just as rooks are known to store walnuts in manure in order that they may not be frozen in, so the autumn campaign of the squirrel is conducted with intelligent regard for the changed conditions which come with winter.

HIBERNATION.

If a cold snap comes early, the squirrel each day travels a less distance from its den, rising a little later each morning, and retiring a little earlier. Finally, if the cold snap holds, he emerges for only an hour or so at midday, and one morning he does not emerge at all. There he is, in his cosy bed, dry and warm, with a goodly supply of food at hand, sleeping his winter sleep, of which we hear so much and see so little.

* *Life Histories of Northern Animals.*

His winter sleep? It is to be feared he does not take it very seriously! Even in midwinter, should the morning bring bright sunshine, he is pursuing his way in his oddly jerky manner, looking very drowsy when first he emerges, but soon wakening up to take a proper interest in things. It is now that, to save depleting his larder, the contents of which he may need when keener weather prevents his travelling far, he turns his attention to the nuts buried in the leafy banks, dodging hither and thither between the patches of pale winter sunshine in search of his hidden treasures. Snow falls during the night, and when to-morrow brings a biting wind, he is not to be seen. Winter and hunger settle upon the land, but the squirrel sees nothing of these things. He is a creature of the sunshine, and Nature in her harsher moods knows him not. One day an old lank fox puts his nose into a chink at the root of the hollow tree and smells squirrel. He sniffs and blows loudly, thinking of the feast so near at hand, and trying, by sheer wind-pressure, it would seem, to blow the squirrel out of the hole in the trunk high above; but Reynard knows he will have to content himself with the smell. Perhaps the squirrel pops his nose from the nook above, lets fly a volley of scornful abuse, and retires to his nest within, leaving the world without to the twittering of the blue-tits and the restless wanderings of Reynard.

In the south of England squirrels do not hibernate unless the winter be of exceptional severity, and it is only in Scotland and the northern counties of England that storage is carried out in the systematic manner described. The hibernating abode is usually a hollow tree, though in Scotland I have known squirrels to den up among rocks

overshadowed by trees, or in a ruined wall. When the nest is so placed, there is always a branch handy on to which the animal can spring should it be disturbed.

DISPOSITION.

In disposition the squirrel is erratic, impulsive, and prettily impudent. In most of the forests of Canada squirrels team in countless thousands, and from sunrise till sunset their scolding chatter greets the woodsman. On Nighthawk Lake, Northern Ontario, I caught one in the act of swimming a bay at least a hundred yards from the nearest land. Probably he had been chased by a fisher or a pine-marten, and had taken to the water as a last resort, for no squirrel in its senses would voluntarily have essayed such a crossing. When I held out a paddle, the little creature at once took hold, and allowed me to deposit him inside the canoe, where he leapt from thwart to thwart, finally flattening himself against the gunwale, imagining himself entirely invisible. There he remained till we bumped the shore, where he leapt for the timber, and sat just out of reach, hurling abuse.

On another occasion I witnessed an amusing incident in which a red squirrel figured prominently. A number of boys surprised the little fellow in the centre of an open road, whereupon the squirrel scrambled for the nearest tree. But the tree, alas! turned out to be a telegraph-post, not more than twelve feet in height, and there he clung, too frightened to descend, unable to climb higher, while the party of juvenile warriors gathered round with shouts of triumph. The squirrel, quite panic-stricken, and probably not knowing what he did, leapt straight and true for the ringleader of the

gang, fixing his teeth in the extreme tip of the boy's nose, and there he hung for a second before another leap took him to the safety of the woods. If ever there existed a band of demoralised and entirely routed warriors, it was that little band of backwoods urchins; and as they escorted their blubbering and wounded leader homewards, one of them summed up the general verdict in the sentence, 'Squirrels and such-like varmints ain't worth meddlin' with!'

NESTING.

Squirrels usually nest in trees, very often selecting a high holly-bush, and placing their abode in a fork of the main stem twelve or sixteen feet from the ground. The nest is globular, having a side-entrance, like the nest of a dipper. The entrance is often difficult to find, owing to the fact that it is overhung with a brow of fabric, which prevents rain and wind from driving in. The nest is called the 'dray' when built thus, and many country dwellers have doubtless wondered why it is that not one in fifty of these nests is occupied. There are several reasons, the chief being that a dray made and used one season remains in the tree for several years ere finally it drops to bits. Another reason is that squirrels, like wrens, make several nests ere finally one is constructed that meets their requirements; so, what with old nests and dummy nests, one may search far ere one ultimately finds the builder at home. Nevertheless, these structures are used for nursery purposes, the young occupying them till the space proves insufficient. At other times the squirrel builds its home inside a hollow tree, or even among rocks, where, of course, it is quite invisible and difficult to locate.

The materials chosen for nest construction are decided by the materials at hand. One pair of squirrels I had under observation in Bolton Abbey woods spent much of their time rooting about at the foot of the undermined river-bank, which was draped with a trailing tapestry of roots. These two built their nest of closely woven fibrous roots, and a very neat nest they made. Another pair in the same woods built near the boundary wall, just over which were two hay-ricks, and hay was the material chosen. It made a very conspicuous and straggling structure, which soon went to bits, so I conclude they were an inexperienced and newly married couple.

As a rule the nest is composed of leaves, moss, and twigs, and I have known green pine-needles and other unsuitable rubbish to be interwoven with it.

MATING.

It seems to be generally agreed that the squirrel has one wife only, and sticks to her for life. My own observations incline me to the view that, though the squirrel may have one wife only, he is not dead to the attractions of his next-door neighbour's wife, especially if his next-door neighbour chances to be a smaller squirrel than he is. Nor am I by any means convinced that the mating alliance always holds good through the winter. For every pair of squirrels one sees together in winter, one sees a dozen living solitary lives, each having its own little group of trees, in which it permits no other squirrel to trespass. One squirrel, thus observed, did to my knowledge rear a family the previous summer, but was never seen either with his mate or with his

young after August; he was distinguished by the possession of an almost white tail. Another solitary squirrel which we knew well finally fell to a keeper's vermin-trap, and proved to be an old male.

Still, the fact that some pairs are seen together the year round would seem to argue that those that respect the laws of squirrel decency conform to the practice of true monogamy; but the individuality of squirrels is very noticeable. I do not believe that all young couples starting life together consider themselves in any way bound by the bonds of lifelong matrimony. If the male happens to be a 'gay dog,' his affections may last no longer than the mating season. As his wife becomes busy with affairs of her own his interest in her is apt to flag, and he may, indeed, become the possessor of a second wife ere the Love Moon wanes. Possibly in later life destiny moulds his ways along a single groove, but a good deal would seem to depend on the squirrel population of the immediate vicinity. Where squirrels are numerous, and the attractions of society are many, scandals of all kinds occur; but isolated 'country' squirrels, living remote from the giddy whirl, are generally faithful to one another. In New Galloway, in Scotland, I repeatedly observed these isolated pairs wintering together. Never was one seen without the other; never were they more than a few paces apart; often they were to be seen on cold days cuddling each other for warmth. I noticed also that the young remained with the parents till far into winter, a state of affairs which seldom occurs where squirrels are more numerous. Indeed, it would seem that the Scottish squirrels are more circumspect than

are those of English forests, and it is conceivable that the question of mutual warmth in the more rigorous climate has something to do with it!*

THE YOUNG.

Only one litter is produced per year, the young numbering from three to six; they appear in May and June, and are not able to fend for themselves till at least five weeks old. They remain with their parents for fully eight weeks, or, as already described, the family may remain united till winter. Certainly the father has nothing to do with the offspring till they are old enough to fend for themselves. He may then, in company with his wife, be seen piloting the brood from tree to tree, for squirrels have their runways in the branches, just as the beasts of the earth have their beaten tracks. In passing from tree to tree a squirrel recognises certain bridges, by which it invariably travels in going from one frequented feeding-place to another. In New Galloway, a squirrel used each morning to come from a beech-wood to feed in a fir-tree in one corner of my garden, and I noticed particularly that it came each day by the same beaten track. Dropping from a silver birch at the edge of the wood, it alighted on the moss-covered wall-top, lightly leapt a gap, pranced across the road, bounded on to a certain moss-covered rock, and thence into the tree. The young squirrels are taught by their parents all these leaps and crossings, and so by a thorough familiarity of their home-

* I am inclined to think that very often one of the young, perhaps the weakest of the family, remains with the mother through the winter; hence it is very difficult to arrive at a definite decision regarding mating.
—H. M. B.

range they are often able to circumvent their foes.

ENEMIES.

Most of the squirrel's foremost enemies, the pine-marten and the larger birds of prey, are gone. One nest which I knew to contain young was laid waste by a stoat or a weasel; it was in a low holly-bush, and the mother haunted the scene of the tragedy for some days. Rats rank among the enemies of all rodents in this country, though to a less extent in the case of the squirrel than in most others. Owls hold no important place among the squirrel's foes, one being strictly nocturnal, and the other strictly diurnal. In the Kells Hills I one day saw a merlin dragging something almost too heavy for it to carry. The little falcon was only just able to raise its load from the ground, flying low for a matter of fifty paces, then again alighting, as merlins commonly do. I pursued with such haste that after several short flights the hawk was compelled to abandon its quarry, which proved to be a full-grown squirrel.

Among the animal's enemies may also be included the pike.

Motoring between Peebles and Edinburgh on 2nd February 1920, I was approaching a fir-plantation, when I noticed something carried by the gale at an oblique angle across the roadway. It struck the edge of the road with considerable force and rebounded, for a half hurricane was blowing at the time. The article was about two hundred yards ahead of me, and I took it to be a portion of a pine-limb. On coming up, however, I found it to be a squirrel!

The poor creature had evidently been killed instantly by its impact with the road, as it must have been blown from branches at least thirty feet above.

Whether many squirrels meet their fate in this way during high winds I am unable to say, but it is possible that the dead specimens one so often finds in the woods very early in the spring are victims to the heavy winds which generally prevail at that season.

CLIMBING.

A gentleman with whom I was acquainted in Yorkshire did all that he could to induce the squirrels to take up their abode in the grounds of his home. Cosy nesting-boxes were put up for them; there were abundant nut-groves and fruit-bearing trees; yet the squirrels, though plentiful in the surrounding country, for some reason would not attach themselves to this particular estate. One comes across a similar state of affairs in the bush localities of Canada, where one valley is teeming with squirrel life, while in the next valley across the watershed, where the conditions appear to be exactly the same, one will not see a single squirrel in a long day's trek.

Though seeming so much at home in the branches, the squirrel is not an expert climber as the tree-dwellers go. Compared with the death-darting pine-marten it is a sluggard. It does not habitually descend the trunk head downwards at full speed, and this is the test of the pukka climbing animals. Yet the squirrel is truly a creature of the trees in so far that, if caught away from their friendly shelter, it becomes utterly

demoralised and dazed with fear, turning and showing fight before even making a proper attempt to escape. Quite recently I found a squirrel out on an open moor, several hundred yards from the nearest pine-fringe, though goodness knows what he was doing there! The heather was deep enough for him to escape unseen, yet he persisted in running round in circles, uttering the most unspeakable abuse, and making himself entirely absurd. His behaviour was reminiscent of that of a foolish little musk-rat who, caught far from his beloved pond, turned and held up a team of horses with its lusty band of lumbermen till some one ended the performance by throwing a coat over him!

USE OF TAIL.

Squirrels are particularly partial to forest-glades through which a stream winds its course, for here the unimpeded sunlight falls with its full warmth to the ripening of the water-side harvest. It is no uncommon thing for one of them to fall into the water; in fact, the observer is tempted to think that they sometimes do this purposely in hot weather, for, as already shown, the squirrel is a moderately good swimmer. He thinks nothing of crossing a burn by leaping from stone to stone, plunging in should there be no stone conveniently placed. When in the water the squirrel has an odd habit of jerking its tail at intervals, and this motion is apt to attract the attention of large fish lurking in the depths. Pike or large trout will snap at anything, and, as Seton points out, many a squirrel has lost its tail while swimming owing to the attack of these fresh-water sharks. The skin strips away from the bone at

the slightest pressure, as does that of many rodents, and though the accident seems to occasion the creature little discomfort at the time, its fate is most assuredly sealed.

A squirrel that has lost its tail will not live; in fact, no greater calamity could befall this little denizen of the branches. It will be noticed that when a squirrel runs along the top of a wall it carries its tail straight out behind, as it does when on the ground; and should it desire to leap a gap in the wall its tail is given a downward sweep as it takes off, thereby giving an additional impulse to the leap. When climbing upwards a squirrel carries its tail vertically over its back, so that the impulse can now be given in an upward direction. And so, in every attitude Mr Squirrel assumes, his tail is so carried that it can be utilised to assist in the direction in which assistance is needed; and similarly, in alighting, he breaks the force of his landing by a sweep of this ornamental extremity. It is his rudder and his parachute; and what happens should he lose this important member, and be left only with the naked stump? All through his life he has allowed for that little extra impulse his tail gave, and for the steadying effect it had when leaping through space; but now he is hopelessly at sea. Here he falls short, failing to catch the branch at which he aimed, and tumbles heavily to earth; there he makes a leap for the vertical trunk, and, unable to jerk his body upwards at the last moment, he crashes head-foremost into the tree, falling dazed and bewildered to earth. It is not the first fall nor the second that kills him, but the many falls that come each day, till in the end, unable to realise what misfortune is his, he

creeps away to some sacred cranny among the kindly shadows.

CRIMINAL SQUIRRELS.

It is to be feared that squirrels do not all live exclusively on nuts and fruits, for there are individual squirrels that acquire a criminal liking for flesh, and when one squirrel in a certain district takes to destroying the eggs and the young of wood-pigeons and song-birds, the rest of the squirrel community of that locality very soon follow the lead. I do not think that all squirrels are given to the ruthless massacre of defenceless fledglings, but the squirrel that has done it once very soon does it again, and teaches his mate to do it. So the bad habit becomes an epidemic, and soon it is a matter either of exterminating the squirrels or of the squirrels exterminating the song-birds.

When last I was in Toronto there was a great outcry against the squirrels in the city parks, it being said on all sides that unless the little murderers were killed off, Toronto would lose its song-birds. In Britain one hears few complaints of this kind against the little tree-dweller, and only once in this country have I come across an example of depredations of this kind. In a gentleman's garden in Kirkcudbrightshire it was found one spring that the song-birds' nests in the shrubbery were being robbed, and naturally suspicion fell upon the cat. The feline was, therefore, kept caged; but still the robbing of nests continued. Then one day a squirrel was caught red-handed, calmly chewing away at an unfortunate fledgling that it had not even troubled to kill. The squirrel was shot on the spot, and from that day the destruction ceased, though many

other squirrels occupied the grounds. This proved conclusively, then, that one little criminal was responsible for all the damage, and that the bad habit he had acquired was *not* shared by the squirrel community in general. One squirrel with which I became well acquainted took up the uncommon pursuit of fishing. This animal lived alone in the Knocknarling valley, near the town of New Galloway, one of those quiet spots Nature provides for her peace-loving kindred. It was a favourite haunt of the roe-deer, and whenever I went that way, keeping a weather-eye open, and moving silently through the trees, I invariably saw their graceful forms floating ahead through the undergrowth.

The squirrel was invariably to be seen near the same bend in the burn, and several times I noticed him paddling about in the shallow water as though searching for pebbles. This struck me as curious, and, watching closely, one day I saw him take what looked like a nut from the water, crack it in his jaws, and proceed to consume its contents. This done, he continued to paddle, keeping his tail high and dry; but, finding nothing further, he ran down-stream, and there repeated the performance.

Going quietly up, I discovered that the objects of the squirrel's quest were a species of small water-snail or fresh-water winkle! Here is an example of a squirrel developing very unusual individual tastes, turning from the trees to the widely different pastime of 'angling'!

In America I have known the squirrels to become as multifarious in their tastes as the bears, visiting the lake-shores in search of dead fish or other carrion washed up on the margin, or gorging

upon the scum of dead May-flies, which hatch out in such countless millions on many of these waters.

But whatever the squirrel may be abroad, whatever isolated examples we may find of individual criminals at home, this creature is a joy to behold, an ornament to our suburban parks, where old city clerks, pausing on their way home for a wistful glimpse of the country, are reminded of the quiet woods by a vision of his russet coat among the branches.

SIZE, AND LENGTH OF LIFE.

Taking the average of ten dead specimens I have measured, I arrive at the following dimensions: From tip of nose to root of tail, 8·3 inches; length of tail, 6·8 inches. This appears to be about the average.

I have no data bearing on the length of life of the squirrel, but such information as exists on the subject indicates that a squirrel has passed the zenith of its powers at eight years, and that it seldom lives to see ten.

COAT.

The coat seems to fade considerably as summer advances, particularly the tail. The winter coat comes in November—earlier in the Highlands. By the end of November the ear-tassels are fully formed. The spring coat is assumed not earlier than May in the north of England and in Scotland, to which area my close observations are limited.



THE GRAY OR BROWN RAT—'THE SPOILER.'

W.A.

S

THE GRAY RAT.

Known also as the Brown Rat, the House-Rat, the Sewer-Rat, the Norway Rat, the Common Rat, &c.

IN the following it is proposed to deal only with the less commonly known habits and characteristics of this odious and universally detested creature, for the gray rat is, unhappily, so well known to every one that a detailed account of its life's history would prove dull reading.

Unto whom the world is indebted for the original stock of gray rats, and whence this animal came when first it made its *début* on our shores, are subjects which hitherto have proved fruitful grounds for exploration among authors of the more serious type of natural history works; but, to sum up the evidence, it would seem that the gray rat hailed originally from Persia, and that it first came to England from the Baltic early in the seventeenth century. Since then there has been a free exchange of gray rats all the world over. From every port where ships touch they have spread, steadily increasing in numbers from east to west till in many parts they have exterminated not a few of the native animals, just as, with their introduction to Great Britain, they speedily exterminated the original black rat, which was a far less repulsive creature. In parts of America the rat population has become too great for the cities, with the result that the usual rat colonists, launching forth, have taken possession of vast areas of swamp, where they thrive and multiply remote from human habitation.

The extraordinary power of survival of these animals is largely due to their ability to colonise, the rat millions of the thickly peopled centres being ever ready to send their pioneers into new country in quest of fortune. So systematic and intelligent are their movements in this way that many picturesque accounts have been written in which something in the way of a central exchange, or distribution department, organised by the rat leaders for the benefit of the rat masses, has been feigned to exist; but there is no special reason why we should imagine that these creatures possess any uncanny powers in the organisation of their numbers. Their intelligent distribution follows in the wake of their numbers as a natural course of events, and their seemingly uncanny ability to locate new quarters is probably owing to the fact that the pioneers and fore-runners leave a scent-trail behind them, which their fellow-citizens, uninvited, and probably unwished for, readily follow.

DISTRIBUTION.

Here is an example illustrating to what extent rats follow in the footsteps of their leaders. When the writer was a boy we had in the grounds of our home a small wooden outhouse where bulbs were stored, and where, incidentally, a brace of ferrets were kept. There was always sufficient food lying about this place to keep one or two rats in plenty; yet, owing to its isolation from other buildings, no rats discovered it for a matter of four years after it was erected. Then one morning it was found that a rat was about. The creature was at once trapped, but it made no difference. Never again was that outhouse without its rat

tenant. One at least was caught weekly, whereupon another would immediately take the place of the deceased, and the nuisance continued.

Thus, when once rats have begun to come to a place, they will continue to do so for so long as food exists there for them—a state of affairs which would seem to prove definitely that they follow in each other's steps, distributing themselves in such numbers as the quantity of available food alone determines.

Hence, if an outhouse furnishes food enough for three rats, the pioneer is quickly followed by two others, which settle with him. Other rats come, and still others; but though a sifting and changing may take place, the forerunners being ousted by stronger rivals, three rats remain in that outhouse. Those that are turned aside wander on in search of fresh quarters; one settles here, another there, but each settler is tracked to his lair, which, if capable of sustaining more than one, he is compelled to share. Should the food-supply be adequate for the maintenance of a hundred rats, then more newcomers, and still more, arrive till the limitation of the food-supply is reached, and once again the overflow goes drifting by to penetrate new territory.

Were it not that rats are so extremely gregarious in their habits, it would, by this system, take them longer to occupy fruitful territory than to distribute themselves over a region where food was scanty, as the absorbing reservoirs would take longer to fill, and so the flowing tide of rats would move less speedily on its way. This proposition is supported by the known facts. It may take years for rats to penetrate into a region where food is scarce, whereas they occupy a fruitful territory in a veritable invading army, sweeping

over the country in a wave of settlement. This is because any move of individual rats quickly becomes a general move; and the greater the number that settle in one locality, the greater is the number of the scent-trails leading to that locality, and the stronger do these scent-trails become, till finally the drift may assume the form of a migration, the rodents moving in shoals from their original feeding-ground to one of greater promise.

It is highly improbable that one rat, finding a paradise of plenty, dutifully returns to inform his neighbours of the fact. Such a feat is not in accordance with the gray rat's disposition, and were he able to retain undivided possession of the new territory, he would readily do so. Reference has been made to the extraordinary hearing-powers of the weasel, and to how this power is exercised in its hunting. There is no doubt whatever that a weasel can tell from a very great distance whether or not the barn on the skyline is infested by rats, and in all probability the rats themselves possess the same power. In most country districts the barns where food-stuffs for horses or cattle are stored are often a considerable distance apart, and in the part of Scotland where the writer lives it is no uncommon thing for a barn to be located at the edge of moorland country a mile or more from any other building, and in the midst of a region where buildings of any kind are so remotely scattered that one can view vast tracts of country without a human structure in sight. Yet the rats find their way to each and every one of these barns where there is food to draw them, and, during the warm months at any rate, every barn has its full complement of rats. It is particularly noticeable, however, that the buildings near water, even though it be the

smallest mountain-burn, are the first to be occupied, as migrating rats are fond of following water—first, because they are habitually thirsty animals; and, second, because its proximity affords them additional shelter. In winter most, if not all, of the rat populations of these outposts drift back to civilisation; nor do they return each year in the same numbers.

All this would seem to indicate that the rats remember from year to year their various feeding-grounds, and since they have by now penetrated to the utmost corners of the country-side, only new buildings are immune from them during the summer months. Old buildings are most favoured, not only because their construction suits the rats' mode of living, but also because old buildings have their established records among the rat populace.

MIGRATION.

Some light has already been thrown upon the why and the wherefore of the rat migrations that take place during certain seasons. Rats are said to move occasionally *en masse* from one point to another, and many such migrations have been witnessed. The failing of food-supplies, or the superabundance of foes in one locality, quickly decides the rats to move elsewhere, but the rate of their going is governed by necessity. If the food-supply gradually gives out, the rats gradually dwindle away; but should the famine be sudden, should the assault of their enemies be fierce and effective, should water or fire invade their territory, then they seek strength in their unity of purpose and migrate in a body. One can be quite sure, however, that they know where they are going, and the horde will very soon split up into

communities distributed with due regard for the necessities of life, just as one can be quite sure that they will drift back into the evacuated territory immediately the conditions which led to their sudden abandonment of it ameliorate.

Such an invasion of rats must, indeed, be a fearsome proposition for the fauna of the territory they invade. A single rat is plucky enough and fierce enough to attack any creature it imagines it can pull down, and rats possess a power of combination which is unparalleled in the animal world. A rat has only to utter a certain squeal in order to bring to the vicinity every one of his fellows within hearing, prepared to unite in a common attack, so that an army of rats sweeping the country leaves behind it an area of death and destruction. In Northamptonshire some years ago an old mill was burnt down, and the homeless rats sought temporary shelter in a long strip of coppice adjoining. It was, unhappily, in the spring of the year, and every nest the wood contained was harried and laid waste, in many cases the brooding birds being killed on their nests. The keeper who watched the property stated that it was some months ere pheasants returned to the coppice in their normal numbers of occupation, while the mice and the voles, with which the dense undergrowth swarmed, must have been entirely wiped out. Even the remains of devoured rooks were found lying on the ground, though it is not reasonable to suppose that the rats ascended the tall pine-trees in which the rook colonies roosted.

Such rat armies, however, do not remain long united. They may travel together for the distance of a mile or more, but after that every hundred yards sees a considerable reduction in their numbers. The spreading and the redistribution

commence immediately, but for several months thereafter—as in the instance just recorded—every stream and ditch within the vicinity of the migration may harbour more rats than usual.

POWERS OF PRECONCEPTION.

Many curious stories have been told about the gray rat's powers of preconception or prescience, and it is, of course, commonly believed that rats will leave a doomed ship, just as it is gruesomely said that a shark will follow a ship carrying a corpse. It is a matter of history that when, in 1887, a great fire broke out among some warehouses on the Thames Embankment, the rats were seen to leave the buildings in a closely packed army some hours before the fateful spark began its dread work, and, swimming together, were observed to put the river between themselves and the scene of the coming conflagration.

During the early Zeppelin raids an old country-house in Norfolk was struck by a bomb and demolished by fire, and I remember reading in the local press a letter from the lady of the house, who, on the evening of the disaster, was alone in one of the downstairs rooms. At about 9.30 she was very much disturbed by the activities of the rats in the walls, stating that 'it sounded as though they were hurriedly leaving the building.' After twenty minutes or so, silence fell, and close upon eleven the air-ship was heard overhead.

Unconvincing though such reports may seem, there is no doubt whatever that rats will leave the banks of a stream subject to sudden spate some time before the water rises to flood them out—even though the storm which causes the water to rise may have occurred some miles away, so

that they can have had no apparent warning. A house in which I lived in Yorkshire was close to a small stream which came down from the moors, and along the banks of which many gray rats made their summer home. Invariably, an hour or so before this stream rose in flood, the rats could be heard under the floor of the house, having forsaken the banks of the burn for this more secure residence. The phenomenon was of such regular occurrence that it ceased to create any wonder, it merely being observed, on the rats being heard, that the brook was about to rise again.

SUMMER HABITS.

I spent the spring and summer of 1919 at an angling-resort by Loch Ken, in Galloway, and here many interesting observations were made on the summer habits of the gray rat. The house stands at the loch-margin, considerably over a mile from any other human habitation. It is surrounded by picturesque woods in which wild life of every kind abounds, and considering the stern nature of this country one would hardly suspect the gray rat, so intimately associated in our minds with the hives of human industry, to be very abundant there. Early in May, however, the rodents began to leave the first signs of their passing, and thereafter, though they were seldom seen, indications showed that they were as numerous as the rabbits that thronged the upper cliffs.

We may digress for a moment in order to contemplate this fact as indicating the strength of numbers the gray rat has attained. We know that every town and city harbours its hundreds and thousands, yet so wide is their range that here, in the heart of the Galloway highlands, their unwelcome presence

in the ever-unwelcome numbers is forcibly brought home to us. They penetrate to the most remote shooting-cabins in the heart of the hills; they are to be found comfortably established by mountain-lochs and moorland-tarns far distant from agricultural activities; in fact, it would be difficult to find any spot within the British Isles upon which the gray rat has not as yet obtruded its presence. Yet these millions, spread all over the country to the loneliest and wildest corners, are merely the overflow from our cities. Were it not that the great centres of population already harbour all the rats they can feed, there would be no country rats. Were all the urban rats destroyed by plague or by some other means, the country rats would throng back into the cities to take their place. The thought is rather a startling one—Great Britain is to-day so overwhelmed with rats that their teeming millions are crowded into the most distant corners of the island in order that all may find the wherewithal to live! This paragraph should be borne in mind in reading later the estimates by authorities of the rat population of Great Britain, for, whereas it may be a comparatively simple matter to arrive at a roughly approximate estimate of the rat population of our cities, he would be a bold man, rather than a wise one, who attempted even to guess at the rat population of country areas. Everywhere where the plough has turned the earth rats may be seen in scores about every storage building at the fall of dusk, and the scene is repeated even in the lonely glens and corries where the buzzard and the peregrine still hold their own. Can it be doubted for one moment that the gray rat, an alien to our shores, and two centuries ago unknown, is to-day over-

whelmingly the most abundant of all our larger mammals? These facts, together with such data as are forthcoming, serve to show that the rat peril is by no means a journalistic dream—serve further to suggest that the era of nature's unfailing remedy, disease, with all its ghastly possibilities, must be drawing near at hand, unless man steps in and by systematic and widespread destruction diverts the ordinary course which nature would adopt in reducing the gray rat's numbers.

To return to the rat population on the borders of Loch Ken. Early in May a distinct runway began to appear, winding up from the water's edge to some outbuildings at the back of the house. At first it was only just definable as it passed in and out among the bracken-beds; but in two or three days it became deeply trodden, and as clearly defined as a human footpath, the earth being stained by the passage of numerous muddy paws. It could now be traced along the water's edge for fully a hundred yards away from the house; while from the outbuildings other runways could be discerned, the one which was most distinct, and evidently the recognised highway, passing straight from the outbuildings along the side of the house, crossing the kitchen-garden, and then on to the loch again. It thereby cut off the headland on which the house stood, the rats evidently considering it unnecessary to make the detour along the water's edge.

At other points by the loch-margin similar pathways could be found every here and there, being as a rule most distinct at the points at which the rats could save a needless circuit by making use of them.

There is no doubt whatever that a constant

stream of rats was coming and going by these runways; and that their numbers were great was clearly indicated by the much-worn condition of the tracks. That new-comers were forever passing was proved by the fact that a trap set on one of the tracks would yield regular results throughout the season, whereas resident rats soon become acquainted with any such peril located on their immediate range, and when one or two have been caught, the whole rat community eschews the spot.

But though many were coming and going the whole of the time, two huge rats, a buck and a doe, settled upon the property. Probably they were mated, but they did not live together. To me they were an endless nuisance, as I was at the time conducting various experiments with electric photography, and every night, if the release-plate were baited, one or both of these beasts would spring the release, flare the flash-lamp, and leave their sinister impressions on the plate. They seemed not to mind in the least the blinding flash, for they would return night after night in the face of it.

The passage of this constant stream of rats, together with the fact that only two remained resident, bears out what has been said with regard to the distribution of these beasts and their habit of following in one another's tracks.

Late in the summer it was decided to remove a chicken-coop that stood on the grass plot near the house. Immediately the coop was lifted a huge rat bounded from beneath it—the buck of the two residents. Fortunately a small Skye terrier was present, and at once closed with the monster, the two keeping up a running fight till some alders were gained, into which the rat climbed with the agility of a squirrel.

The dog was unused to dealing with such formidable quarry, and when the rat was poked out of the tree it made its teeth meet in the terrier's nose, and there followed a rough-and-tumble encounter which at first promised the defeat of the terrier. Human interference, however, decided the fate of *Mus decumanus*.

The rat's stronghold was then examined, and proved a source of great interest. The floor of the chicken-coop was insulated from the ground in the usual way by intermediate struts, and within the space thus provided between the floor and the ground the rat had made its summer home. Into the cranny it had dragged a vast quantity of leaves and dry grass, but the most interesting point was that the brute had cunningly closed all spaces that might admit draught (save for the one hole it used) with small sticks and bits of rushes. Near to the hole by which it came and went was an accumulation of loose leaves, which probably formed a virtually self-closing and draught-excluding door.

The nest was located in the most sheltered corner, and near to it was the beast's larder. A more disgusting sight than the latter I never saw. It consisted of the entrails of a rabbit, the skin of a pike, and other oddments of filth and house-refuse in an advanced state of decomposition, and a swarming mass of burying beetles. The stink was positively unbearable; yet there was every possibility that this loathsome beast, sleeping within touch of this foul mass of carrion, had on occasions entered the dairy of the house where our own food was stored! This is what is happening daily all over the country, and still we find the majority of people quite indifferent as to whether rats thrive or are exterminated!

Unfortunately the female rat escaped us, though the gardener discovered her nest, all ready for young, when one day repairing a breach in the garden wall. She too had her larder, containing two adult sandpipers and their three pretty little newly hatched chicks. These birds had built their nest quite near the house, and, owing to their tameness and their pretty habits, had much endeared themselves to the household. We had, indeed, watched them closely since their nesting activities began, and it was with a sense of keen regret that we learnt thus of the falling of the whole family to so odious a trespasser.

One big gray rat spent the summer two years in succession in the bank-burrow of a water-vole on the river Wharfe. Invariably this beast could be seen within fifty feet of the burrow. It was often astir during broad daylight, and on being disturbed would take to the water and swim below the surface till its burrow was gained, in exactly the same manner as a water-vole. One evening, when fishing, I caught the brute in my landing-net, but it contrived to escape; though the fright it received evidently induced it to change its quarters, as it was seen no more in that locality. Invariably the summer quarters of gray rats that take to the country are at the edge of water.

DESTRUCTIVENESS.

The destructiveness of the gray rat is too big a subject to attempt to deal with in any exhaustive way, and accordingly a few facts must suffice to illustrate the point. A good deal has been written of late setting forth actual figures of the damage done by rats, and of the peril they present in our midst by spreading disease through the

medium of their parasites, or even by the contamination and filth of their own persons.

In this connection it may be as well to reiterate the fact that research has resulted in the discovery that the terrible bubonic plague, which at times reaches such horrifying dimensions in India and China, is communicated by rats to human beings by the medium of the rat flea, and it must be borne in mind that so long as rats remain with us in their present numbers we ourselves are assured no immunity. The plague is nature's plan of keeping the rat multitudes in check—otherwise they would overrun the whole earth—and the flea is nature's means of spreading the disease from rat to rat. Incidentally, it is also the instrument by which the infection is spread from rat to man.

Deaths from this plague in India alone reach many millions periodically, and occasional outbreaks of it occur in Britain, generally in our big seaport towns, where rat-infested ships come to harbour. Rats suffering from plague have been caught in England, and if once the epidemic got moving in earnest it would be virtually impossible to check it. Since 1914 rats have increased enormously in numbers, and here and there the rat population must already be so dense that the animals can be regarded as living 'under unclean conditions,' which in the case of the rat means disease.

As regards the material damage actually done by rats—the destruction of valuable materials that is taking place in every village and town of the British Isles—one needs only to picture the loathsome hordes to be seen swarming forth at the fall of dusk from every suitable harbourage where food for them exists. Rick-yards, knackeries, slaughter-houses, warehouses, docks, stores, sewers, shops—

everywhere and anywhere that food-stuffs or filth exist—gray rats are to be found in numbers decided only by the shelter obtainable for them and the food-supply at hand.

‘In a knackery in the north of England,’ writes S. L. Bensusan, ‘food was placed in a room to entice the entrance of rats, and at midnight the door of the room was closed. Next day men and terriers entered to destroy the spoilers, and over a quarter of a ton of rats were killed!’

‘Kylratt’ estimates that in six months a hundred rats will consume two thousand quartern loaves and twenty-seven bushels of sharps. Another authority estimates that each rat costs the country 7s. 6d.* annually.

A farmer in the west of England who, in 1919, was prosecuted for allowing two of his stacks to crumble to bits owing to the activities of rats, admitted that the damage done to one stack alone approximated to a hundred pounds. To quote again from Bensusan: ‘In 1917 two large wheat-stacks were not thrashed owing to the difficulty of obtaining a thrasher; and when eventually a machine was procured, one stack yielded only four sacks of wheat and many hundreds of rats, while the other was considered unworth the expense of thrashing. The stacks had been estimated to be of considerable value when made, the wheat on neighbouring fields being well up to four quarters to the acre.’

NUMBERS.

In the first three months of 1919 Leicestershire made a return of sixty-five thousand rats killed, yet there was no appreciable lessening of their numbers in that county. Dr A. E. Shipley estimates the

* Pre-war estimate.

rat population of Great Britain and Ireland to be equivalent to one rat for every human being; but this would seem to me a very conservative estimate. A large number of dwelling-houses harbour many more rats than they do human beings; farms, especially those having rick-yards attached, retain a rat retinue which outnumbers its human inhabitants by at least ten, and possibly fifty, to one. In our cities the walls of many human dwellings, and of every factory, storehouse, and warehouse, harbour rats, while the animals congregate in thousands about slaughter-houses, refuse-dumps, and the like, to say nothing of the hordes that dwell in the underground sewers and culverts. It would seem, then, that the rat population of our urban areas far outnumbers the human population, and I have no doubt whatever that the balance in favour of the rat is even more marked in country areas, agricultural or otherwise. In many cases the rat population of a single barn would exceed the human inhabitants of the whole village; then we have the numerous rats living remote from man's habitations, in stream and hedge banks, together with those that take up their quarters in isolated barns. Two hundred millions would probably be a more accurate estimate of the rat population of Great Britain and Ireland; but taking it at Dr Shipley's conservative estimate of forty millions, and accepting the previous authority's calculation that each rat costs the country 7s. 6d. per annum, we are annually paying this creature the handsome sum of £15,000,000 for living in our midst! Dr Shipley himself reckons the damage done by rats as amounting to £10,000,000 annually, while Sir James Crichton-Brown's calculations agree with the sum of £15,000,000. In all probability only

those rats living in granaries, wheat-stacks, and such places do damage averaging out at 7s. 6d. per rat; rats living in book-shops, hotels, furniture-stores, &c. probably do a great deal more, but this is liberally offset by the swarms of country rats that in summer do very little damage at all.

IN AMERICA.

It is estimated that fires in America due to defective insulation of electric cables cost the country £3,000,000 per annum, and it is definitely proved that the majority of these fires are caused by the gnawing propensities of the gray rat. Fires are also produced by rats gnawing lead gas-pipes, and many disasters have occurred through their activities in this line. One American authority estimates that it costs large towns, such as Baltimore and Washington, four millions annually to maintain their rat battalions; and it must be borne in mind that, owing to the construction of American buildings, fires are a far more potent peril there than in this country.

In addition to gnawing cables, gas-pipes, books, and valuable ivories, rats have been known to gnaw the teats of pigs and goats, the feet of small children, and to destroy sucking-pigs and even calves. Nothing, indeed, not even man himself, is secure from them. In the main sewers of London it is customary for men to work in pairs, as owing to the size and numbers of the rats it is deemed unsafe for the workmen to venture singly into these dim corridors. Shelves and runways are provided for the rats, as at one time it was considered that they were of value as scavengers, though now it is generally realised that even amidst

the filth of their choice these obnoxious creatures are of little or no service to man.

In ancient villages and old dwelling-houses generally the rats' subterranean tunnels tap the drains and the sewers, and passing thence into the walls of the buildings, allow foul gases to enter the living-rooms—in fact, to permeate the whole of the dwellings—a state of affairs which is doubtless the cause of sickness and disease. I remember a case of this sort occurring in the north of England. The atmosphere of the front-room of a small house was on several occasions noticed to be tainted, and in the end it became so bad that investigations were made. It was then discovered that the rats, by removing the mortar from the foundations directly under the room in question, had thrown the chamber into atmospheric communication with an old sewer, not previously known to exist, which ran alongside the house. The room had been in daily use by the family occupying the house—they were accustomed to congregate there in the evenings. It goes without saying that this state of things exists in scores of old houses and cottages in our cities and in the country. No wonder the pressure of public opinion has at last induced one or two of our lethargical health authorities to take steps for the systematic destruction of this enemy in our midst, and the movement is one in which each individual should consider himself or herself bound to be personally active. On no occasion should a gray rat be allowed to live if it is within our power to bring about its destruction.

METHODS OF EXTERMINATION.

It is of no use ridding a building of its rats unless, when this is done, steps are taken to prevent,

or at least impede, the return of others. Ferrets and terriers probably afford the best method of getting rid of the rats in the first place, though in some cases they can be dislodged by pouring water into their holes. This method is obviously of no use where the rats are able to escape the water by climbing inside the walls. When it is practised, a piece of wire-netting should be placed over the hole into which the water is poured, to prevent the rats from escaping by that way, the terriers being kept in readiness at the adjoining holes. Immediately the work is completed, all holes in the masonry should be mortared up, slats of tin nailed over gnawed doors and other damaged woodwork, and holes in the ground thoroughly made up; otherwise new rats will immediately take the place of those that have been killed.*

Steel traps are not sufficiently wholesale in their effects to warrant general recommendation; though it is a good plan to keep three or four always set in obscure corners, as their presence tends to make the place unpopular among the rats. They are also useful about chicken-runs, &c., and when set should not be baited. Rabbit-traps are far preferable to the small steel rat-traps, as they generally kill the rat outright; and the trap should not be handled before being set. A clean steel trap has practically no scent, but an old one should be smoked or smeared with oil—bacon fat is excellent—before it is set. When it is being set it is best to erect a pen by placing two boards on edge, the trap being laid between them.

A most efficacious plan for wholesale extermination is to select a chamber which can be rendered

* Holes filled with broken glass and tar are permanently abandoned.—
H. M. B.

rat-proof by cementing up all the holes in the walls. Leave the door open two or three nights, and feed the rats in the chamber with some food they cannot carry away and store. When it is evident that the rat population has become accustomed to gathering there after nightfall, secure a string to the door in such a way that it can be slammed-to from a suitable distance. The rats having thus been trapped, they can be left imprisoned till daylight, when terriers are introduced to do their work.

Another excellent plan is one which was recently practised in a Liverpool warehouse, and with such effect that the refuse-collectors finally refused to handle any more dead rats from this particular warehouse. An iron tank, containing about eight inches of water and of suitable size, was covered over with a sheet of strong, glazed paper. Immediately above the tank, and about eight inches from it, a dead hen was suspended from a beam along which the rats were in the habit of running. Everything being thus prepared, several long slits were cut in the paper covering of the tank, so that, while appearing solid, it was in reality a pitfall. The rats that attempted to mount to the fowl by the tank inevitably met their fate, while those that climbed down from above naturally dropped rather than attempt the difficult climb back. Hundreds of huge rats were killed in this way, and it would appear to be a thoroughly practical method.

BREEDING.

Figures bearing upon the gray rat's powers of reproduction create a sense of dazed paralysis in the mind, and it need only be said that their rate

of multiplication is such that, if none were killed, a pair of rats might at the end of two years have descendants to the tune of ninety thousand!

But, although figures illustrating this point may appeal to some as vaguely amusing, the actual results attained should provoke tears rather than laughter. Though not fully developed till six months old, a gray rat under suitable conditions may begin to breed at the end of five weeks. The first litter, however, is a small one, numbering, probably, not more than three. Thereafter the number of litters per year, and the number of young per litter, are decided entirely by the circumstances in which the rat lives. If the season is normal, neither too hot nor too cold, and food is plentiful, the gray rat will produce six litters annually, the young numbering from eight to twenty at a birth. Working on a basis of a wide range of statistics, we arrive at the fact that a normal gray rat living under normal rat conditions—in other words, the average rat—successfully brings into the world forty-eight children per year. Accepting the predominance of bucks which seems always to exist, this would give us twenty female children to the year, each of which may begin to produce its equally fertile offspring at the end of five weeks, and thus *ad infinitum*.

The young are blind for fourteen days, and if the male rat plays any part in their existence, it is by bringing that existence to a sudden end, to his own epicurean satisfaction. The young leave the nest at the end of about eighteen days, and at this age are to be seen abroad at all hours, little larger than mice, and readily falling victims to any kind of trap that may be set for them.

If hunger happens to come upon the rat population, the feebleness of the community falls to the stronger—which means that the very young are killed by the old, and that the very old are killed by the middle-aged. In short, only the fittest, which probably are the middle-aged, escape death at the hands of their own kind.

It would seem that gray rats habitually kill off the old male members of their communities; and it may be observed that when a rat is found living alone, as, for example, the summer rat described as living in a bank-burrow by the river Wharfe, it is invariably an old buck which, having had one attempt made upon his life by his clansmen, has sense enough to avoid further encounters by living a life of isolation and solitude.

LENGTH OF LIFE.

Sixty-eight years may be taken as the average length of man's life, which is approximately four times the period required for him to arrive at full organic, if not muscular, development. This rule, however, can seldom be applied successfully to animals of the lower order. By their rate of living man is a short-lived creature. Few of them have reached the zenith of their powers by the period at which, correspondingly, senile decline begins to show in human beings. This, together with such data as are given elsewhere in this book, seems to indicate that it is the mind, rather than the body, which decides a creature's length of life. Man wears badly in the carnal order of things, because his mind is more active than his body; while as a general rule creatures that hibernate, and whose minds, therefore, are inactive for a portion of their existence, outlive those that are astir the year

round. Slow thinkers are slow liver, and therefore they live long.

The gray rat has probably not reached *le premier Octobre*, as the French call it, by the end of the second year of its existence, and the solitary males, driven out from their colonies, are in all likelihood living in their fourth or fifth summer. At six years a gray rat would have far outlived the majority of its kind, and I doubt whether the females breed after their third year. These statements, however, are based on such scanty observations that they border upon guess-work, and no doubt the whole question is decided by the conditions under which the rat lives, which means the rate at which it lives. A female that begins breeding at five weeks old, and thereafter produces five or six litters annually, naturally does not continue to breed so long as one living at a more moderate rate; and it is probable that the bucks outlive the does, as most of the very old rats caught or observed are bucks.

DIMENSIONS.

An adult male rat usually scales about 13 oz., the females from 14 to 16 oz.; 20 oz. is not a rare weight. The average tip-to-tip measurement of males can be taken as 16 inches, of which the tail accounts for 7 inches.

THE WATER-RAT OR WATER-VOLE.

FOR the benefit of the uninitiated, let us first be quite clear on one point—that the water-rat or water-vole is quite a different creature from the house-rat, for whose sins this pretty and interesting little animal is often made to suffer. The water-vole belongs exclusively to the river pastures and the bank-burrows. It is often plentiful in towns where the gardens border a river, but it never under any circumstances trespasses upon the odorous runways of the odious house-rats. Living in earth burrows around which vegetation is green, it seldom, if ever, penetrates the drains, but is a clean-living animal whose habits resemble those of the beaver. It is essentially a beast of the water's edge.

The water-vole is very much smaller than the house-rat. Its fur is denser and deeper; its head is short and blunt, somewhat like that of a guinea-pig. In fact, the animal is as blunt at one end as the other, and viewed at a distance, as it sits up nibbling a husk held in its delicate forepaws, it looks a strangely oblong little beast.

The fur of the water-vole varies in shade from mole-blue to hare-brown. Occasional specimens are quite russet. The undercoat consists of fine, blue fur, so close and silken that water does not penetrate it, and the brown shades belong to the outer coat of *hair*, which is tipped with this pigment. I am inclined to think that as the animal grows older the outer coat—the hair, that is, as distinct from the under-fur—increases in length, so that the colour with which it is

tipped predominates more and more as the seasons pass. Thus an old water-vole may be quite brown, simply because its blue under-fur does not show through its outer coating of brown hair; but a young vole may be quite blue, the shade of its under-fur being the predominating hue. At all ages the fur is so dense as to give the oblong appearance already referred to, there being a distinct ruff round the neck, while the small, blunt ears are completely buried in their surrounding covering. Black varieties are known in parts of Norfolk, Suffolk, and Scotland.

The fact that in summer-time the gray or house rats often turn the water-voles out of the bank-burrows and take possession of them may be the cause of confusion between the two. Thus, in addition to suffering the first injury from the rats, the voles, as a direct result of the said injury, are subjected on their return to man's persecution in mistake for the unwelcome invaders.

CLANNISHNESS.

Water-voles are clannish little creatures. They live in families, and appear to be much devoted to each other. The families do not intermingle. Each little clan has its own strictly observed range, and does not trespass on the preserves of its neighbours. A boulder of rock in mid-stream may be the common property of all; but even here the clans do not associate, though all may use the boulder in passing. If a member of one clan is already on the rock, and a member of another clan swims up to rest there, the first tenant immediately makes off, as though anxious to avoid a *tête-à-tête*. This I have noticed many times. Similarly, if one vole is compelled to

cross the water-front of another, it does so, as far as is possible, by keeping to the water. Should it, while crossing, see the owner of the property, it at once quickens its pace almost to a stampede. It would seem that they at all times expect attack from members of their own race, except from those with whom they are associated, and to whom they are probably related.

Very often the clans are distinct from each other not only as regards their recognised beats, but also as regards their appearance. Thus it may be observed that the voles occupying one corner of a river are quite a different shade from those across the way. This, however, is purely a matter of family characteristics.

Let us follow the establishment of a clan. A male and a female water-vole who have survived the merciless weeding-out of winter establish themselves in a bank-burrow in the very early spring, and forthwith produce children. As these grow up a second family appears, and the first family now disperses from the nursery-burrow, each to make a home for itself quite near. The various members of the family do not live together, but their respective homes are all on the same patch of property. When they meet, it is as friendly acquaintances, to nibble each other's faces, or perhaps to share in the same feast. They are members of the same clan.

In due course more families, and still more, make their appearance, till the congestion is relieved by the older children developing ambitions of their own, which lead them forth in fortune's quest. If, however, the property be sufficiently productive of food, the children and their children may settle near, till gradually, with the growth of the colony,

the family splits up automatically into different clans, each within hailing distance of the next, yet each respecting the other's rights.

GENERAL CHARACTERISTICS.

The water-voles are creatures of daylight habits, lovers of the sunshine and of the bright scenes of life. They are fond of crossing and recrossing the water by which they live, and many times, from high up in the hills, I have looked down into the valley, where the river wound like a silver ribbon across the green landscape, to see one of these little creatures, visible from an immense distance, gamely swimming across, the arrow-head of ripples clearly marking its course. The buzzard, hanging in the wind, evidently knows that it is of no use tilting his planes and gliding down in hot pursuit, just as the wolf knows that it is of no use trying to catch a prairie-dog at the mouth of its funnel-shaped burrow.

Owing to its water habits, this species has managed to survive many of its near kindred which, though sharing its habitat and being more productive, were exclusively creatures of the land. The water-vole is essentially a beast of the water, and though it does not possess fully developed webbed feet, it is, at any rate, like the beaver, clothed for a watery habitat. The young take naturally to the water almost as soon as they are born—before, indeed, their eyes are open to the light. This is evidently nature's safeguard against the effect of floods, which are the chief among the water-vole's foes. In hilly country the rivers and burns are apt to rise with surprising suddenness at any season of the year, flooding out the bank-burrows; and though, as a rule, the nursery-

dens are placed above normal flood-level, a spate of exceptional violence may reach the young ere their mother has time to carry them away. Were they totally unable to help themselves, such a flood might lead to terrible havoc among the water-vole population all up and down the river, and would, in all probability, sweep away that narrow margin which lies between extermination and the comparative prosperity of the species—a margin which, in wild life of every kind, is so narrow as to leave little room for new foes.

But, though apparently more advanced in at least one respect as a creature of the water than is the otter, the water-vole is by no means a complete master of that element. How long can a water-vole live under water? Probably no longer than a trained human swimmer. If flustered and hurried, it is unable to remain totally submerged for more than forty seconds, and, unlike the chicks of moor-hens and other water-fowl, it never hides *completely* beneath the surface. Its diving abilities are developed just so far as to enable it to achieve concealment by diving till it has reached some point of safe harbourage, such as a bank-burrow, the roots of willows, or dense rushes. Like the otter, it will lie submerged when hunted, only its nose above the surface, taking advantage of any drifting cover, and almost invisible as its body swings with the current.

During heavy spates, when the rivers are bank-full and the burrows flooded, the water-voles are dependent for their lives upon 'playing 'possum' in this way. I have many times observed them at it, swimming hurriedly from point to point, and lying concealed at every patch of cover to watch and listen. When one flood has succeeded another

in quick succession, I have known them to forsake the river entirely, and to make temporary homes along the banks of the tiny brooks trickling down from the hills, or even in the heart of the upland woods, comparatively remote from their beloved element.

But though the river may at times prove treacherous, it is nevertheless the water-voles' best friend. Accustomed to seeking the water when distressed, they have no idea of defending themselves, or of making the best of what chances exist, when water is not at hand. A water-vole caught out in the open on dry land will even turn and face man, so great is the panic of its despair. If beset by stoat or weasel, it makes no attempt to get away, and, as described in the chapter dealing with the weasel, that animal will speedily exterminate a whole family of water-voles if there is no water at hand for them to go to.

The water-vole appears to be much prized as a food item by all predatory birds and animals, and for this reason it cannot be doubted that in its natural environment lies the secret of its survival. If the voles had been purely dry-land animals, they would not exist to-day; but as things stand, the weasel or the stoat, entering a water-vole's burrow, is apt to find it empty, the occupants having escaped in the ace of time by the back exit, and so into the water, which retains no lasting scent. Similarly, the hawk, striking from above, is foiled by the vole's lightning plunge, and its eyes not being trained to look below the surface, the bird is unable to follow the course of its intended victim. Indeed, it is to be noticed that few animals seem to be capable of looking into water with an intelligence that takes count of anything moving

below the surface. I remember on one occasion a ratting expedition entirely failed owing to the fact that the terriers could not be made to see the bolting rats as they swam below the surface, albeit the water was dead-clear and not a foot in depth, while the rats were as visible to us as they dived across the gravel as they would have been on dry land.

NATURAL FOES.

The water-vole's natural foes are many, though it may suffer little by their activities except in winter. Since it is nocturnal in its habits as well as diurnal, owls probably stand foremost among its wild enemies. An owl will spend much of its time patrolling a river or a stream where these voles exist, or in waiting silently for their appearance, perched with alert watchfulness on a boulder or in the branches. The heron also is supposed to take water-voles, and there is no doubt that this bird would very readily snap up a young vole that it could easily swallow. The adult voles, however, appear to possess no fear of the gray-coated 'angler,' swimming boldly within reach of his bayonet bill; and as regards any extensive damage, the heron can be written off as a winter foe only. The same applies to the otter, for, though living on apparently friendly terms with the voles during the summer, an otter will make terrible inroads into their numbers in winter, when trout are so poorly conditioned as to afford little nourishment. The gray rats probably do not destroy water-voles in any great numbers, as the more timid creatures simply clear out as soon as the rats come, having more sense than to dispute their right of entry.

Next to the owl, large trout and pike probably rank as chief among this little creature's blood enemies. A seventeen-pound pike caught in the river Ken, in Kirkcudbrightshire, within a mile of Loch Ken, contained a whole family of half-grown water-voles, together with a full-grown wild duck ! It almost reminds one of Harry Tate's pike, which enclosed a motor-cycle, a sewing-machine, and part of a tree, and I would put it down as belonging to the same category of pike story if I had not been personally active in the downfall of this particular fresh-water shark. Large trout, similarly, will take anything moving that they consider there is the least chance of their swallowing ; but since they are less numerous than pike, and are probably less given to hunting along the margins, they figure less prominently among the water-vole's foes.

Salmon, on their up-stream journey, do not interfere very much with the regular residents of the stream ; but in winter, when on the redds, they become ugly in character as well as in looks, and doubtless many a vole, crossing the sheet of water which he considers his, and which the salmon consider theirs, is savagely dragged down by them to be torn to ribbons in the gloomy depths.

Otters, herons, and salmon, then, are added in winter to the list of the water-vole's standing foes. During that season frost and flood-waters, hunger and privation, beset the little creatures' lives, so that wise and cautious is the vole that lives to breed its kind. In summer the water-voles flourish and multiply ; in winter their numbers are reduced to the minimum which suffices to produce next year's normal stock. Thus, while autumn may see the water-vole population of a given stretch

numbering five hundred, next spring may find only twenty mated pairs spared to maintain thereon the footing of the species; and so on season after season. In flat country they probably fare no worse than in our northern hills, for, though the floods spread over a wider area, the flood-waters are less turbulent, food is more plentiful, and, generally speaking, the cold snaps are of shorter duration.

The water-vole is seldom found at an altitude exceeding eight hundred feet. It belongs to the lush lowland valleys, where the growth along the water's edge is rich in seed-producing herbs and many varieties of green-stuff. Sometimes, but not often, specimens are found by mountain lochs and tarns; but, so far as I know, the animal is never resident there, and the occasional specimens seen are probably ambitious wanderers that have loved and lost, and finally lost their way.

The water-vole does not exist in Ireland.

BREEDING AND NESTING.

The water-vole's powers of multiplication during spring, summer, and autumn are not nearly so great as those of the gray rat, and naturally the rate of mortality is very much higher. The voles are strictly monogamous, and both parents are to be found with the young. The male, indeed, would appear to be an ideal parent, since he certainly helps his mate in her nesting activities, and seems to possess a sense of kindly solicitude for his offspring. Probably not more than two litters, numbering from seven to nine per litter, are produced during the spring and summer.

Whether water-voles remain mated during the winter would appear to depend on circumstances.



THE WATER-VOLE.
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If their home be well sheltered and secure, it is probable that the union holds good ; but during winter the water-voles of our rapidly flowing brooks and rivers in the north generally live solitary lives. It would seem that when the mating bond no longer exists they very easily drift apart, and the flooding-out of their burrow may cause each to seek new quarters quite independently of the other. In winter the struggle to keep alive is so unrelenting that, whatever their intentions may be, the mated couples are apt to be mercilessly separated ; though it is probable that, where circumstances favour it, a once mated couple remain mated for life.

According to some authorities the young are sometimes born in the bank-burrow ; but more frequently, so far as I have observed, the nest is situated twelve or twenty yards from the water's edge, out in an open pasture or in a wood. Generally it is underground, but so near the surface that cattle are apt to tread through the roof, bringing destruction upon the family. When the young are growing, they appear to obtain a good deal of their exercise by extending the burrow in every direction, till eventually it becomes a warren, resembling a maze of mole-runs.

Not infrequently the nest is above ground, concealed by the shelter of overhanging grasses. It is a large nest, consisting of reeds cut into suitable lengths, or of any other material that comes handy. In this case the young are conveyed to the bank-burrow, soon after they are born, by their mother, who carries them in her mouth by the loose skin between their forelegs, and the young forthwith amuse themselves by extending the bank-burrow in the way previously described.

It has been said that the young are sometimes born in the bank-burrow, but this statement is based on reference rather than on personal observation. The bank-burrow often contains a cosy nest of which the newly born are found to be making use, but so far there is no definite proof that they are actually born there. I should say it occurs seldom, if ever. More probably they are born quite near at hand, possibly in the hollow trunk of a willow, possibly in an open nest, and are conveyed to the bank-burrow as soon as they are old enough to be carried. The dread of flood-waters is probably at the back of this guarding instinct.

THE BANK-BURROW.

The water-vole observes no rules or customs in its manner of architecture. It loves to construct its tunnels among the roots of river-side trees, so that its home is braced not only against the assaults of flood-waters, but against burrowing animals larger than itself. Generally there are one or more bolt-holes below the surface of the water, so that the occupants of the burrow can escape from it unseen, to take cover in the reeds or the bushes near. Well above the water-line the burrow is enlarged here and there, forming chambers sufficiently spacious for dining-rooms and bedrooms. The burrows very often become considerably enlarged by the action of water, and may finally be taken possession of by otters.

In addition to its water entrances and exits, the bank-burrow invariably has at least one exit on the land side, perhaps seven or eight feet from the water's edge. This, however, may be very little used, as it exists chiefly as a ventilator. Old

burrows are often very extensive, representing, as they do, the activities of family after family of youngsters who have worked off superfluous energy by enlarging their quarters, while at the same time procuring a good deal of food by prospecting among the roots.

DIGGING-POWERS.

Like the mole and the badger, water-voles are expert diggers. They will even construct underground subways rather than risk exposing themselves in the open. One of these tunnels may run for a considerable distance from the water's edge up into a wood, for example, or even to a river-side garden; and, like the mouse-creeps in the grass, it is tapped by intercommunicating subways till a veritable maze is formed. What the beaver canals are to the beavers, these subways are to the water-voles. They exist purely for the transportation of food, and their chief value is that, the animals being of daylight habits, they can venture far afield without exposing themselves to the attacks of birds of prey, foxes, &c.

As a rule, the subways are not connected up with the bank-burrows, for if this were so they would prove a source of danger by bringing weasels and the like to the very threshold of the little engineers. Generally the subway entrance is several yards from the home burrow, though sufficient cover lies between the two to enable the rodents to pass from one to the other without being seen.

The tunnels are very similar to those constructed by moles, even to the casting up of mounds of earth which mark their course. In fact, I have known an experienced mole-catcher to make the error of

setting his traps in water-vole subways which he mistook for mole-runs, finding out his mistake when he came to look at his sets.

The digging propensities of the water-vole do not seem to be very well known, and the subways may exist only in localities where the earth is sufficiently soft to render their construction easy. Many examples were under my observation in the valley of the river Wharfe, near Burnsall village, to which locality these observations are almost entirely limited.

PERIODICAL INCREASE.

The water-vole population of any given locality varies considerably with the seasons, as seems to be the case with all wild creatures of the water-side. In some localities they may for a season or two become a veritable plague, infesting the water's edge in thousands, and drawing all manner of predatory birds to the vicinity. Such plagues, however, are of short duration, and are usually followed by a corresponding period of scarcity. What is the cause of this it is difficult to conjecture. Disease does not appear to be among the water-vole's foes, flood-waters taking the place of it, and therefore their sudden disappearance after a term of abundance is probably due to migration.

SOLITARY INDIVIDUALS.

The case of the bank-beaver, which neither toils nor spins, but which lives its life remote from its fellows in a bank-burrow of its own, has its exact counterpart in the world of the water-vole. One regularly comes across old and solitary individuals

living their lives in sunny bachelorhood or spinsterhood, unfettered by family cares, and existing only for their own pleasure. Whether, like the bank-beaver, they are outcasts, expelled from the social intercourse of their kind, or whether they are solitary merely from choice, it is impossible to tell.

Such a solitary specimen inhabited the banks of a small pond, fed by an overflow arm from the river, all one spring and summer under the writer's observation. He was an exceptionally large vole, and seemed totally devoid of ambition. The roof of his bank-burrow had crumbled in, but he made no attempt to improve things. One of the main outlets contained in course of time a hornet's nest, but he did not seem to mind. A dead toad was never removed from another exit till the burying beetles removed it.

This vole was seen regularly by the anglers who visited the pool, and many commented upon his tameness. It is quite probable that 'he' was an old female vole, whose age forbade her taking a further active part in the multiplication of her species, and whose declining interests no longer embraced the various errant-knights that came her way. Other voles lived quite near at hand, but this romantic old recluse apparently never associated with them.

Another solitary specimen lived by the banks of a whirlpool at no great distance from the first, and was seen on several occasions chasing other voles from the locality. So far as one could judge, this individual had entirely dispensed with the use of a burrow, evidently considering himself above such things, and made his home among the chaos of loose rocks piled at the water's edge. Here he

had many runways and landing-platforms, and from the general aspect of things he did himself very well. Certainly he had annexed the most sunny and sheltered corner obtainable along the whole river-stretch.

SIGNALLING.

So far as is apparently known, water-voles have not advanced to the level of the beavers in the employment of any recognised system of inter-communication. A beaver in search of a wife forthwith advertises the fact by planting notice-boards (otherwise castor signs) all up and down the landscape, particularly at the river-forks, where the advertisement is likely to catch the eye of passing pedestrians of his own species, though not of his own sex. If the water-voles possess any such system, they have managed to keep it secret, and in all probability their sense of smell is their only aid to matrimony.

These animals, however, adopt the same system as the beavers of spreading the alarm by diving noisily when danger threatens. They do not, apparently, strike the water with their tails as the beavers do, but dive with such suddenness that the water closes behind them with an abrupt 'plop,' which can be heard at a considerable distance. This action is instantly copied by other voles, startled by the noise, and so the alarm is spread up and down the river-bank ahead of the approaching danger. When diving ordinarily, water-voles do so in perfect silence; it is only when they are alarmed that the suddenness of their immersion automatically creates the alarm-signal. So far as can be ascertained, this marks the limit of the water-vole's attainments in the way of intercom-

munication which has for its end a purely social object.

SWIMMING.

It is a curious fact that though swimming comes naturally to the water-vole, while with the otter it amounts purely to an accomplishment, yet the water-vole never attains the complete mastery of the water attained by the otter. At the best it is but a poor swimmer, and compared with the otter it is a weakling and a land-lubber. When an otter is under water it swims with its whole body, like a leech, propelling itself belly upwards or in any other position convenience dictates; but the water-vole, on the other hand, swims like any other rodent. When diving, it propels itself entirely by its hind-paws, using its forepaws for groping its way, grasping here a pebble, there a twig, and so turning and steering its course with its forepaws, while its hind-paws are used solely as paddles. Some authorities state that the animal propels itself with all four paws when diving in alarm, but though I have repeatedly watched water-voles most closely I have never seen the forepaws to be used as paddles. Their function appears to be limited exclusively to influencing the direction of travel.

Of course, there are obvious reasons why the otter has attained a higher standard of perfection in the water than has the water-vole; for, quite apart from the fact that the otter is a creature of unusual gifts, it is dependent on its swimming-powers for capturing its natural food; that is, it has to swim for its living, whereas the vole swims merely for convenience and safety. The smaller animal is in no way dependent upon its diving

abilities for its food; in fact, its needs in the under-water line extend just so far as, and no farther than, is necessary for evading its foes. An under-water passage of a few feet generally suffices to take the vole to a place of safety, and its abilities do not exceed these simple requirements. It is, if anything, a weaker swimmer than is the house-rat, for if its initial dash for cover fails, it quickly loses heart, and falls an easy victim to its persecutor.

MENTALITY.

It will be seen from all that has been said that the water-vole stands well up in the scale of intelligence—higher, indeed, than many of the larger mammals with which this book deals. It possesses the gift of profiting by previous experience, which is the true measure of wisdom in the wild. It has learnt by sad experience that flood-water is the most potent of its foes, and accordingly it guards against this inevitable peril in the best way it knows. It places its nest and its winter store, if such it should happen to possess, well above high-water mark. It constructs its bank-burrow in such a way that it cannot be drowned, or be frozen in during winter frosts. Realising the peril that lurks in the skies, it digs subways to its distant feeding-grounds so that it can come and go unseen. When its young are very small, surprise floods are their greatest danger, and so they are nursed above flood-line. Immediately they are old enough to move about a little the danger of surprise attacks from weasels or gray rats outweighs the danger of the flood, and so they are taken to the bank-burrow, where the water that might have drowned them is at hand to save them.

Should a flood now occur, the young are old enough to contend with it, and unless it be one of exceptional violence, the peril it presents is less than that which exists from the murderous beasts without.

All these things the water-voles of to-day do not, probably, reason out for themselves ; the knowledge of them has been inherited from countless generations of forefathers who, atom by atom, grain by grain, have profited by their experience, and, acting accordingly, have handed their lessons on to their children, thus establishing such life habits and customs of the species that we have to-day a water-vole that can hold its own. Many have perished where the water-vole has survived, and no doubt it was the same gift of profiting by sad experience that, in the dim long ago, taught this little creature that water was its friend, and that at the water's edge it was better able to evade its many foes than on dry land.

To-day the water-vole is aquatic simply for protective purposes. Naturally it has acquired a taste for many water-loving plants ; but the requirements of its ordinary life, not taking into account its foes, do not necessitate the close proximity of water. It is capable of flourishing on dry land, as its foods are not limited to the water's edge, and it affords one of the few examples in wild life of a creature that has chosen its habitat solely with a view to holding out against its enemies.

To this choice only does the water-vole owe its survival. Slow-footed, short-sighted, an exceptionally slow breeder, prized as a food item by all carnivorous birds and beasts, and withal sufficiently large to provide a tempting meal, the water-vole could not have lived on had it not sought the

water as a place of sanctuary; and it is solely because it possessed this advantage of environment not shared by many other rodents which were infinitely more productive than itself that it lives to-day, while they are gone. The fact of its survival alone, then, in the face of so many foes, and with its limited powers of multiplication, is sufficient proof of its intelligence.

In a way that is more likely to come within the notice of the casual observer, the intelligence of this little animal is shown by its quickness in recognising certain individuals. The solitary water-vole already alluded to as living by the pond had no fear whatever of anglers. It evidently recognised them as peaceful individuals who did no harm to any one but themselves, and it was no uncommon thing for the animal to swim within a yard or so of an angler fishing the pool. One Sunday, however, my brother and I went that way garbed in the garments of respectability, and the water-vole, with one fearful look at us, made a headlong plunge for shelter, and thereafter remained concealed!

A man in charge of some trout-hatcheries told me that the voles by his fish-ponds had become so tame that they almost permitted him to handle them, but if by any chance a stranger accompanied him to the ponds, there was never a water-vole to be seen!

Food.

The water-vole is almost entirely a vegetarian, and one can study its habits closely for some considerable time without finding a single exception to its vegetarian tastes. It lives chiefly on the shoots of willows during the spring, sitting upright and stripping off the bitter bark with its forepaws,

then nibbling the soft pith within. It eats also a variety of water-plants, and tender shoots of almost any kind. In autumn it eats practically any variety of seeds that come handy, and in winter may gnaw the bark of any species of hardwood, as rabbits do—gnawing generally at the roots just where they enter the ground. Grass, daisy-roots, clover, bulbs of all kinds, and beech-mast lying on the ground appear to be appreciated items of diet; while potatoes and sweet chestnuts are regarded as most desirable dainties.

I have never known this creature to eat carrion. On one occasion we threw a dead hedgehog among some driftwood about which water-voles were daily seen, but there it remained, untouched by them, till the next spate bore it away. On another occasion a dead sheep, carried by the current, lodged near a water-vole burrow, and a day or two later a portion of the sheep protruding above the surface was seen to be gnawed. Here, we felt sure, was the expected evidence, but subsequent observations proved beyond a shadow of doubt that the gnawing was the work of a gray rat. The water-vole, therefore, is of no value as a scavenger, and will even ignore the water-logged stem of a cabbage washed up near its home.

Nor is this animal guilty of raiding the redds of trout and salmon, as is so often thought. Such depredations are limited to its interesting little congener, the water-shrew. A river-keeper in the north of England made a rule for many years of trapping and destroying in every way possible the water-voles that visited his trout-hatcheries; but subsequently he learnt that, though the voles did a certain amount of damage by burrowing in the banks of the ponds, and further by forcing creeps

under the wire-netting so that water-shrews and rats could follow them, their presence was in no way detrimental to the welfare of the young trout in the ponds or of the spawn in the hatcheries. In the end he allowed the voles to remain, as he discovered—according to his own evidence, which quite satisfied him—that they were effective in destroying a particularly noxious dragon-fly larva, which fed exclusively on the small and weakly fish. One of these destructive creepers would sit on a stone slab just where the water trickled into one of the ponds, and immediately a young trout drifted near it would propel itself forward by a downward flip of the upturned, fin-like tail, catch the fish in its powerful forceps, and drain its life in a few seconds. After the coming of the voles the remains of these hideous larvæ were regularly found on a stone slab above; but it is still a very open question whether they were destroyed by the water-voles, or by water-shrews entering the wire-netting by the creeps of the voles. If by the shrews, it is at any rate refreshing to find that they did something to pay their way.

One or two naturalists refer to the water-vole's partiality for fresh-water mussels, which it is said to eat by gnawing a hole through the shell at one side near the hinge; but there seems insufficient evidence to prove that this is the work of voles and not of shrews, which, while very carnivorous in their habits, are, moreover, very secretive. Water-voles are regularly seen close to a place where the empty mussel-shells lie about; and since the shrews are never seen there, their activities being nocturnal, the natural conclusion is that the voles are responsible. Further information bearing on the water-vole's alleged carnivorous habits would

be greatly valued. Up to the present we are probably fully justified in regarding it as no more carnivorous than is the beaver.

WINTER HABITS.

So far as one can judge, the storage habit is less strongly developed in the water-vole than in most of its congeners—certainly less strongly than in the gray rat. The musk-rat and the beaver both have their stores, and it is probable that in a country of long, severe winters the water-vole would fall into line with the rest.

Sometimes, but not always, the water-vole lays up a plenteous winter store. 'Starprint,' whose life-history I have written elsewhere, certainly laid aside a small store for the first winter of his existence. It was situated in a short burrow in an upturned root at least a dozen paces from the little fellow's bank-burrow, and contained chiefly bulbous roots retrieved from the perilous wood high above his home. The store-room was at the end of a short passage among the twisted roots of the fallen tree, and when Starprint was flooded out of his bank-burrow he made his home there. It seemed a precarious winter home, since there was no back-way of escape; but ultimately it proved to be an impregnable stronghold, the tough and twisted roots that bound the earth defying the efforts of Mr Reynard, who tried to dig Starprint out.

His store, however, was entirely inadequate for the rigorous winter that followed, and could, at the best, have served only to tide him over a short term of frost and snow.

When winter comes, many of the water-voles leave the river-banks for more sheltered quarters. They are particularly fond of small ponds nestling

in woods, and overgrown with a dense entanglement of briar and berry, and here, having their creeps deep in the undergrowth, they may spend the winter unseen and unsuspected. During exceptionally cold snaps they often remain underground for days on end, and this fact would seem to suggest some kind of a store within the dwelling. In all probability water-voles, like many other creatures, hoard their stores unsystematically in various places, a little here and a little there, instead of placing all their eggs in one basket; and though we have on sundry occasions found *caches* at the water's edge, among the undermined roots of river-trees, or in the hollow trunks of the trees themselves, and though the work looked like that of water-voles, no decisive proof was forthcoming. It is, however, very difficult to understand how this little animal could survive a winter of exceptional severity if it had no store of some kind on which to fall back. Its diving-powers, as already stated, are not great, and it is almost inconceivable that it could keep itself alive for any length of time by procuring its food from the bed of the pond or the stream beside which it lived. In some cases this might be done, but the gravel-beds of most of our northern streams must be particularly unfruitful, though many water-voles manage to winter by them. Assuredly these individuals do not keep themselves alive by diving for their food. Similarly, I have known several voles to winter by a little woodland pond, the bed of which consisted of unfertile clay thickly covered with decaying leaves. In such cases the vole that had no store would, when the earth was frost-bound, be compelled to obtain all its food from above the ground, thereby exposing itself to such perils that it would un-

doubtedly fall ere the coming of spring. It is only reasonable to suppose, then, that this creature, so highly intelligent in other ways, counts among its gifts the ability to lay aside for a frosty day with a forethought more liberal than is generally imagined.

ECONOMIC IMPORTANCE.

In no directly obvious way is the water-vole of any special value to man except in that sense whereby a wild creature of any sort adds something to the joy of life. On the other hand, it is to be feared that the tunnelling activities of this otherwise lovable little beast often lead to the partial inundation of meadow-lands dependent for their immunity from flood on artificial walls, and that these same activities bring the miller's curses upon the heads of the water-vole population for damage of various kinds. No doubt they cost the country a good deal in this way, for a bank once perforated is difficult to repair with any degree of permanency. Yet to encourage the general destruction of this little creature would be to show a spirit of the utmost vandalism.

DIMENSIONS.

The weight of adult specimens is usually about 6 oz., and may occasionally attain 8 oz. The length of head and body seldom exceeds 8 inches. The tail varies considerably in length, but rarely reaches $4\frac{1}{2}$ inches; from $3\frac{1}{2}$ inches to 4 inches is probably about the average.

DISTINGUISHING FEATURES.

The forefeet have only four complete toes, the thumb being marked merely by a claw. The hind-

feet have five complete slender toes, between which there exists the first indication of a webbing. The tail is thickly haired. The ears are very short, and almost hidden in the deep, soft fur surrounding them. The water-vole's eyes are small and black, and regard one with a pathetic expression. Its sight is not good.



THE WILD CAT.

THE WILD CAT.

PRIOR to the war the wild cat had shrunk to its last-line trenches north of the Caledonian Canal, but since then it has increased enormously, and can now be said to be firmly re-established throughout its ancient Highland haunts, from many of which it has been absent for the major portion of a century. In the east it has penetrated as far south as Gleneagles, in the west to Loch Lomond, and in central Perthshire to Glen Lochay. The Canal presents a difficult barrier, but in this southern movement the favourite crossing-place appears to have been between Invermoriston and Fort William. In 1926 I could account for over a hundred wild cats taken by rabbit-catchers and keepers along this line of country. At first their destruction led to a general outcry at the vandalism of wiping out an almost extinct species, but to-day the destruction of the wild cat is so common an occurrence that the newspapers cease to comment upon it. Few creatures are more destructive to the wild life about them; and withal *Felis silvestris*, even where most abundant, is very rarely seen. During the last few years I have sent seven wild cats to various zoological collections; one of them I took in a herring net, an experiment I am not likely to repeat, but none of them survived a month of captivity, in spite of every care in the feeding and housing of them; yet one taken as a kitten has survived for over twenty years in a cage at Drumnadrochit.

It is a curious fact that a domestic cat running wild very soon begins to lose the distinguishing features of its class, and to assume in their place the characteristics and appearances of *Felis catus*. Some years ago a half-starved and wretched little kitten came to my door in search of food. It was given milk, and thereafter came daily for two or three weeks, calling till it was fed, and it was noticed particularly that the animal was growing in strength and developing into a remarkably fine cat. It never attached itself to the house, and having been fed, it immediately assumed an attitude of distrust towards those upon whom, a minute or two previously, it had fawned for food.

Spring came, and the kitten had disappeared for some weeks, when one morning I happened to look out of my window just at daybreak, and beheld an immense 'wild cat' prowling about on the top of a pergola—green-eyed, heavy-coated, its tail bushed out like a bottle-brush! It was almost twice the size of an ordinary domestic tom, yet there was no doubt whatever that it was the kitten I had fed—thus, all unwittingly, having inflicted a veritable demon of destruction on the surrounding wood and moors! When I opened the window the brute was off in an instant, nor did I ever see it again.

This kitten was probably the offspring of a wild tabby parent of the tame variety, and its offspring, in turn, would acquire still other features in common with the truly wild species, at a sacrifice of what remained in the way of domestic traits.

Thus the longer domestic cats are wild in habits the more do they become wild in appearances. Given a lonely Highland country, we are apt to come across specimens which have sprung

from a long line of ancestors unacquainted with man's threshold, which have bred for generations past with renegades and cut-throats of the same stamp, till they have formed a race of their own—a race as much distinct from the tame cat as they themselves are distinct from *Felis catus*. Those who would deny all strain of the wild cat in the domestic species should bear these points in mind, for it would certainly seem that the tame cat has more points in common with *Felis catus* than it has with *Felis caffra*, from which sprang the domestic cats of Egypt. It may be taken that the offspring of domestic animals which run wild ultimately return to the strain from which they sprang, and there is no doubt whatever that domestic cats left undisturbed to breed in the mountains would finally produce a strain so closely resembling the wild cat of our own island that, except in point of size, it would be hard to distinguish one from the other. Climatic conditions may, of course, account for the acquired similarity, for the conditions in our own mountains are widely different from those of Africa, Arabia, and Syria, the lands responsible for *Felis caffra*; so that a cat which has become wild by living among wild conditions is as likely to be influenced by those conditions as it is by a far-off ancestry which was probably mixed to begin with—if, indeed, one *can* begin with a mixture!



There is, also, another possible explanation for the acquired similarities referred to. At one time *Felis catus* was far more plentiful than to-day, existing not only in the mountains, but everywhere that woodland shelter made its existence possible; indeed, it existed in England long before it existed in Scotland. Thus our original stock of tame

cats, which may have sprung from *Felis caffra*, were wont to wander off into the woods, where undoubtedly many a tabby became amicably acquainted with *Felis catus*. Her kits were born under the shelter of man's roof and grew up as domestic cats, which, in turn, were impregnated by wild toms, till the blood of *Felis catus* became firmly infused in the make-up of their descendants—possibly predominating over that of the original *Felis caffra*. Had the interbreeding gone on long enough, an untamable strain would have resulted. Such strains probably *did* result, and remained in the wild, and it is by no means uncommon to find wild domestic cats set up in collections as genuine wild cats. I may add that I have come across many cases of interbreeding between the wild cat and the domestic cat, examples quite recently being in the collection of the Scottish Zoological Society.

DISTINGUISHING FEATURES.

The distinguishing features of the wild cat are, first, its great size. As a rule this alone settles the question, for an adult wild cat may measure as much as 3 feet 8 or 9 inches from tip to tip; a wild strain of the domestic species never attains this size. Second, its *tail*, which is relatively shorter, more bushy, and more distinctly ringed than that of the other species. Pulled forward over the back, the tail does not extend farther than the tips of the shoulder-blades, while the fur covering the appendage is almost as dense as that of a prime red fox.

The head of the wild cat is proportionately wider and less elongated than that of the tame variety, its ears being enormously far apart; while

the centre-lines of the ears, if extended, converge at a much wider angle—that is, the ears point outwards more. Thus: tame cat, ; wild cat, . The eyes are very much larger and rounder, and, as a rule, the body-colouring is strikingly yellowish. The limbs are longer and much more powerfully developed; indeed, the wild cat is a creature of enormous strength, far surpassing that of any domestic offshoot. I have seen half-grown wild cats in captivity larger and more powerful than any domestic tabby that ever imposed its diabolical presence on a game-covert.

GENERAL CHARACTERISTICS.

The habits of *Felis catus* differ from those of the domestic tom only in so far as its inbred fear of man, its relatively greater strength, and the fact that it is a truly wild animal exert their influence. It is essentially a creature of the timber, and prefers the pine-slopes to the bleak mountain-tops which to-day often afford it sanctuary. It may make its home among the rocks, but always there is woodland near wherein it hunts—even though such woodland consists only of pine-forest strips encircling the glens and corries.

In circumventing their prey, few of the cats depend to any great extent upon their speed—excepting, of course, the cheetah and the leopard, the former of which is reputed to be swifter than the greyhound or even the antelope. The lynx depends upon two or three final bounds for overtaking an intended victim it has previously stalked, and thus it possesses abnormally developed hind-quarters with which to perform these bounds—just as the rabbit is similarly developed in order to evade them. All the cats are exceedingly strong

in the hind-quarters, but in the case of the domestic cat and of the wild cat it is for a different reason. In a dog-fight it is the top dog that comes off best; the dog at the bottom is at the mercy of the whole of the community, and at once becomes the common sport of all. In a cat-fight, however, it is the bottom cat that holds the 'upper hand,' and woe betide the one on top when those awful hind-claws get to work with their rending, tread-mill action! A cat's main idea in a close fight is to roll on to its back, and, holding tightly to its victim with foreclaws and tusks, set its deadly hind-legs to work with terrible effect. It is a devilish, cattish way of fighting, but one which is, nevertheless, truly efficacious, for in this way a cat, wild or tame, will completely disembowel an opponent larger than itself.

FOOD.

It has been said that the wild cat is of arboreal habits, for it is among timber that young rabbits, its chief food, are most easily caught. It catches and kills squirrels by cautiously stalking them; then, waiting with the unrelenting patience of the cat tribe till the squirrel has no easy way of retreat, the wild cat bounds out—a paralysing vision of thrashing claws and barred and bristling fur! That it feeds largely on squirrels, where they are plentiful, is known; but probably its methods of hunting them are quite different from those of the marten. I have known a tame (?) cat to catch squirrels by waiting till they descended to the ground, then surprising them either from above or by a tremendous leap across the open. A cat leaps so lightly and easily that the observer obtains no impression as to the speed at which it travels, but its great quickness

is indicated by the fact that very few creatures are sufficiently rapid in movement to evade it.

It is probable that in timbered country, where birds are plentiful and easily caught, and where mice abound in the leaves, the wild cat subsists chiefly on such small prey; but as a rule it haunts country where larger game is abundant, and where it has very little opportunity of woodland hunting. It may surprise the whitethroat in the bushes, or the ringdove on her nest in the fir-thicket; or, again, it may feast upon ptarmigan, grouse, black-game, or hare caught napping in the open moor or on the bracken-slope. Mountain hares and rabbits it kills in large numbers, but all the wild cats prefer feathers to fur. Generally they kill what they can catch most easily, and in the spring of the year young rabbits and the young of all kinds of birds, whether sacred to man's possession or not, form their prey. The wild cat has also been known to destroy roe-deer fawns, and it is even more destructive than Reynard where young lambs are concerned. Thus not only the hand of every keeper, but that of every Highland shepherd, is raised against it, which accounted for its pre-war rarity. The wild cat could probably stand the drainage imposed by keepers alone, but when the shepherd joins hands with the keepers it is all up with the creature whose fate their forces are united to seal. The shepherds generally know the wild fauna of the hills as well as, if not better than, the keepers, and their method is stealthily to discover the lair of the wild cat, then to destroy her kits either by digging them out, or by poking a long stick with a knife attached into the nest. A tragic incident as to how a shepherd met his fate while engaged in

this wise is told by Colquhoun in his absorbing book, *The Moor and the Loch*.

The food of the wild cat, then, may be summed up as follows. Like all the cats, it prefers an abundance of small game to worthier quarry, but where small game is insufficiently plentiful, or too difficult to catch, it will kill anything it can hold. Its destructiveness on game-reserves is, therefore, determined by the proportion of game-birds to other kinds of food. If rabbits and small birds are everywhere, it probably does little to bring about the unrelenting persecution to which it is subjected; if, on the other hand, small game is scarce, and the creatures man wishes to preserve possess the country-side *in excelsis*, then naturally the wild cat makes a business of catching and killing those creatures which were its birthright ages before man took to controlling for his own ends the populace of the woods.

The real home of the wild cat is the high, rugged deer forest, and its chief enemy, therefore, not the keeper, but the rabbit-catcher, whose traps and snares it systematically robs. At this juncture it is interesting to call to mind that, in tracing back the history of the domestic cat, we find that it superseded the pine-marten as a domestic exterminator of mice and rats, the pine-marten having an earlier standing as a beast associated with man's hearth than has the tame cat of to-day.

METHODS OF FEEDING.

The wild cat's method of feeding is to seize its prey and depart with it into the rocks—leopard fashion. If there is no timber into which to go, it proceeds, snarling and spluttering as its

jaws close in the death-grip, into some corridor of the rocks where it can feast in security. It is not the way of the cat tribe to slay their game in the open and to feast under the rays of the sun or the moon, as the case may be. They prefer always the shadowy alley-ways where, by back-handed methods, they can avoid such inconveniences as are apt to arise as the result of dishonesty. If its prey is too large to carry, then the wild cat crouches upon it, trusting to its own terribleness of aspect to repel the would-be avenger of the murdered innocent; and of one thing we can be sure, that never, within the normal order of things, does a wild cat face in mortal combat a creature which it knows to be half so well equipped a fighting-machine as itself.

MATING.

So far as I can ascertain, the wild cat is monogamous. Where a member of one sex exists there is usually a member of the other. The father, however, has nothing whatever to do with the up-bringing of his children. Probably he does not see them till they are three parts grown, when he may cuff them out of his way if he happens to meet them. It is merely that he dallies in the locality favoured by his wife in case he may be needed. Cats do not hunt together except in countries of extreme cold where the alternatives are unity and starvation or disunity and death. The days of the packing of the wild cats are long since past.

BREEDING.

Only one litter is produced per year under normal conditions; sometimes, but seldom, a second litter appears in August. The number of kits per litter

is usually two or three ; four is not uncommon, and as many as seven have been reported, but this suggests interbreeding. It all depends upon the food-conditions and the age of the mother. Since few wild cats live to grow old, few have large families ; and fewer still reach the stage of saddling themselves with a second litter as the year advances.

HOME-RANGE.

The wild cat is a creature of very limited home-range. If man did not exist, and there were no wolves and such like, it would probably live and die within a few hundred yards of some central point, its range being dependent upon the abundance or otherwise of food. As things are, a wild cat, or, rather, a brace of wild cats, haunt one locality till they are scared out. Then they betake themselves elsewhere ; and thus their home-range may appear to be greater than it is.

At one time the life of the wild cat doubtless consisted of hunting until it was satisfied, then of basking on a pine-limb in the sunshine, occasionally stretching its long claws into the pink bark, or fawning under the stream-bank where the herbs grow rank, rubbing its face against those that appealed to its fancies—a life of idle plenty befitting its abnormal powers among the creatures of the wild. Game preservation has moulded its habits into a creature of the high ridges, haunting the deepest cairns in company with the badger and the mountain fox, skulking and nocturnal in habits—a creature which, perhaps, we could well afford to lose, were it not that its loss would rob our remote Highlands of yet another of their rapidly shrinking romances.

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